# DOCUMENT RESUME

ED 151 152 SE 023 481

| | |
|---|---|
| TITLE | Draft Guidelines for State and Areawide Water Quality Management Program Development. |
| INSTITUTION | Environmental Protection Agency, Washington, D. C. |
| PUB DATE | Feb 76 |
| NOTE | 316p. |
| EDRS PRICE | MF-$0.83 HC-$16.73 Plus Postage. |
| DESCRIPTORS | Annotated Bibliographies; Citizen Participation; Cost Effectiveness; *Environment; *Federal Legislation; *Guidelines; Land Use; Management Systems; *Pollution; Public Health; *Water Pollution Control; *Water Resources |
| IDENTIFIERS | *Environmental Protection Agency |

ABSTRACT

This document discusses the draft guidelines formulated by the Environmental Protection Agency (EPA) to assist the states in establishing a management program to integrate water quality and other resource management decisions. These guidelines are pfovided so that the long range goals of the Federal Water Pollution Control Act Amendments of 1972 can be met, especially the mandates of Section 303 and Section 208. An extensive annotated bibliography is included. (CS)

***********************************************************************
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
***********************************************************************

ED151152

# DRAFT GUIDELINES FOR STATE AND AREAWIDE WATER QUALITY MANAGEMENT PROGRAM DEVELOPMENT

U S DEPARTMENT OF HEALTH
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Bernard Lukco

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

U.S. ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460
FEBRUARY 1976

SE 023 481

# DRAFT GUIDELINES

for

# STATE AND AREAWIDE WATER QUALITY MANAGEMENT PROGRAM DEVELOPMENT

ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460
FEBRUARY 1976

# FOREWORD

Final regulations dealing with the State continuing planning process policies and procedures (40 CFR 130) and the preparation of State and designated areawide water quality management plans (40 CFR 131) were published in the Federal Register on November 28, 1975. Regulations for obtaining grants for planning (40 CFR Part 35 Subpart A) were also published on November 28.

These regulations require that the States assume responsibility for preparation of water quality management plans for the entire State--directly in nondesignated areas and indirectly in designated areas through coordination with areawide agencies. In addition, the regulations set forth the required elements which State and designated areawide agencies are to include in their water quality management programs.

The guidelines are intended to assist State and designated areawide agencies in developing implementable water quality management programs consistent with the requirements set forth in the regulations. While it is not possible for EPA to provide answers to all the water quality problems that should be resolved, these guidelines describe the overall factors which should be taken into account and provide a framework for agencies to use in developing their water quality management programs.

This draft is scheduled to be revised as appropriate and published as final during the summer of 1976. Any comments or suggested revisions should be addressed to the Planning Assistance and Policy Branch, Water Planning Division (WH-554), Office of Water and Hazardous Materials, Environmental Protection Agency, Washington, D.C. 20460.

Mark A Pisano

Mark A. Pisano
Director
Water Planning Division

# TABLE OF CONTENTS

1. Introduction
   - 1.1 Purpose
   - 1.2 Applicability
   - 1.3 Timing
   - 1.4 Objectives
   - 1.5 Output Requirements
   - 1.6 Overview

2. Continuing Planning Process Development and Approval
   - 2.1 Purpose
   - 2.2 Major Stages
   - 2.3 Detailed Guidance on Required Process Elements

3. State Water Quality Management Plan Development
   - 3.1 Scope and Purpose
   - 3.2 Program Objectives
   - 3.3 Program Content
   - 3.4 Planning Criteria
   - 3.5 Planning Sequence
   - 3.6 Technical Planning
   - 3.7 Management Planning
   - 3.8 Combined Plan Evaluation and Selection
   - 3.9 Plan Outputs
   - 3.10 Submission Procedures

4. Public Participation
   - 4.1 Introduction
   - 4.2 Public Participation Program Development
   - 4.3 A Model Program for Public Involvement
   - 4.4 Institutional Alternatives for Representation of the General Public
   - 4.5 Program Evaluation
   - 4.6 Advisory Committee

5. Water Quality Standards Revision

6. Land Use Considerations
   - 6.1 Introduction
   - 6.2 Develop Area Subplans through Land Use Analysis

7. Nonpoint Source Management Considerations
   - 7.1 Introduction
   - 7.2 Statutory Requirements and EPA Policy
   - 7.3 Planning Methods for Selection of Best Management Practices

8. Point Sources Considerations
    - 8.1 Introduction
    - 8.2 Planning Approach for Point Sources
    - 8.3 Municipal Wastewater Facilities
    - 8.4 Other Point Sources
    - 8.5 Combined Sewer Discharges
    - 8.6 Industrial Wastewater
    - 8.7 Development of Alternative Subplans

9. Management Responsibilities and Institutional Arrangements
    - 9.1 Introduction
    - 9.2 General Management Responsibilities
    - 9.3 Regulatory Program
    - 9.4 Waste Treatment Program
    - 9.5 Basic Issues in Management Agency Designation

10. Financial Arrangements
    - 10.1 Introduction
    - 10.2 Requirements of the Act
    - 10.3 Development of Financial Plans
    - 10.4 Budget Preparation and Supporting Documentation

11. Cost Assessment Considerations
    - 11.1 Introduction
    - 11.2 Basic Concepts in Estimating Costs
    - 11.3 Specific Cost Questions
    - 11.4 Generalized Cost Estimation

12. Techniques for Coordination
    - 12.1 Introduction
    - 12.2 Coordination Techniques

13. Environmental, Social, and Economic Impact Evaluation
    - 13.1 Purpose
    - 13.2 Environmental, Social, and Economic Impact Evaluation Process
    - 13.3 Environmental Effects of Selected Plan

14. Comparison of Alternatives and Selection of Plan
    - 14.1 Purpose
    - 14.2 The Plan Selection Process

Appendices

Guidelines Supplements:
No. 1. Best Management Practices for Nonpoint Sources

# CHAPTER 1

# INTRODUCTION

## 1.1 Purpose

The purpose of these guidelines is to assist the States in setting up a management program and institutional arrangements to integrate water quality and other resource management decisions. The central purpose of this management program is the development and implementation of State Water Quality Management Plans so that the longer range goals of the Federal Water Pollution Control Act Amendments of 1972 can be met. To achieve these goals, it will be necessary to develop a water quality management process at the State and local level that assures continuous planning for and implementation of pollution control measures. These guidelines present a suggested framework for developing water quality management plans. The management plans should be directed to meet two principal mandates of the Federal Water Pollution Control Act Amendments of 1972: (1) the determination of effluent limitations needed to meet applicable water quality standards including the requirement to at least maintain existing water quality (Section 303); and (2) development of State and areawide management programs to implement abatement measures for all pollutant sources (Section 208).

## 1.2 Applicability

These guidelines are directed toward State agencies responsible for developing a continuing planning process and State or areawide agencies* responsible for developing State Water Quality Management Plans. Since the States may delegate their responsibilities to local, regional, substate, interstate, and federal agencies to develop and implement part of their water programs, these guidelines also apply to these other governmental entities.

## 1.3 Timing

All States have developed a continuing planning process consistent with Section 303(e) of the Act. As part of the process, the States submitted Phase I Water Quality Management Plans by July 1, 1975 (or have been given an additional extension of up to one year by the EPA Regional Administrator to submit such plans). Phase I plans are directed toward setting out effluent limitations needed by point sources to meet existing State water quality standards.

---

*Agencies that have been designated and have received planning grants prior to July 1, 1975, should continue to follow the Guidelines for Areawide Waste Treatment Management Planning, August 1975, and their approved project control plans.

These guidelines pertain to the second phase of implementation of the effluent limitations and water quality standards requirements of the Act. In Phase II, States must consider revisions to water quality standards to achieve the national water quality goal specified in Section 101(a)(2) of the Act. Plans to meet these goals must be developed and should consider all available means to meet water quality standards including effluent limitations for point sources and management of nonpoint sources.

While Phase II planning is a logical outgrowth of existing State Water Quality Management Plans, the long-term goals to be achieved through Phase II plans and the complexity of resolving pollution problems from both point and nonpoint sources may require a State to amend its existing management program to ensure proper coordination among the various components of its water program. Decisions regarding organizational responsibility for completing Phase II Plans should be contained in the State/EPA Agreement (§130.11) including the proposed designation of areawide planning agencies to undertake certain elements of Phase II Plans. An even greater need may exist to consider how the State's management program for water quality can be complemented by and support other resource management programs in the State. In addition to organizational and program management revisions to the State's continuing planning process, the State Water Quality Management Plans themselves may require substantial changes to meet the longer term goals of the Act and to develop abatement programs for all pollutant sources.

The timetable of some of the more important dates in Phase II is as follows:

- November 28, 1975 -- Promulgation of 40 CFR Parts 130, 131
- January 27, 1976 -- Identification of areas eligible for designation under Section 208(a)(2)-(4)
- April 26, 1976 -- Continuing planning process revisions submitted to Regional Administrator (by this date Governors should have indicated final determination of areas to be designated under Section 208(a)(2)-(4))
- April 26, 1976 -- Complete documentation of areawide planning area designations to be submitted to Regional Administrator

- July 1, 1976 -- Phase I Water Quality Management Plans due where extensions have been granted
- November 1, 1978 -- State WQM Plans due for final submission (including portions of State WQM Plan delegated to areawide or other planning agencies)
- November 1, 1978 -- Governors designate management agencies to implement the plans

## 1.4 Objectives

The overall objective of the Act is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters" (Section 101(a)). To achieve this objective, "it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation inand on the water be achieved by July 1, 1983" (Section 101(a)(2)). To enable meeting the Act's objectives, "it is the national policy that areawide waste treatment management planning processes be developed and implemented to assure adequate control of sources of pollutants in each State" (Section 101(a)(5)).

The objective of the State's continuing planning process is to establish a management program and arrive at implementation decisions contained in State Water Quality Management Plans and other plans prepared pursuant to the Act to meet the 1983 water quality goal, wherever attainable.

## 1.5 Output Requirements

The required outputs of the State continuing planning process are summarized in 40 CFR §130.10(a)-(c). Guidance on how to develop a continuing planning process to meet these requirements is presented in Chapter 2.

The required outputs of State Water Quality Management Plans are stated in Part 131.11(a)-(p). An interpretation of specific outputs that might be needed to meet these requirements is found in Chapter 3. The States and other agencies carrying out planning responsibilities pursuant to Parts 130 and 131 are encouraged to use whatever planning procedures best suit their needs. The planning procedures discussed in Chapters 3 through 14 restate the requirements of Parts 130 and 131 and provide some possible approaches for developing State Water Quality Management Plans.

## 1.6 Overview of the Continuing Planning Process and State Water Quality Management Plan Development

The following is a summary (with simplified examples) of how the State might develop its continuing planning process and Water Quality Management Program:

### A. Continuing Planning Process

Developing a continuing planning process entails a series of steps in which information is gathered on existing water quality programs and decisions are made regarding how to adapt existing programs to the longer term objectives of the Act. These steps might be conducted as follows:

#### 1. Process Design

The first step is the determination of the agency to be responsible for developing the continuing planning process. Once this agency is chosen by the Governor, it should develop an overall design of a process to meet the requirements of 40 CFR Part 130. This involves definition of how the State's existing water program will be modified to meet Phase II requirements. The initial process design will be further refined as each component of the process (described below) is developed in greater detail.

Example: The Governor has designated the State water quality agency to be responsible for the State's continuing planning process. The State water quality agency has begun to array a description of the existing water program, its elements, and their relationships against a listing of changes needed to meet the revised requirements for a continuing planning process. The State agency has separated its process design into the following functional headings: inputs to the process (including existing programs related to water quality, public participation, and intergovernmental input); development of a State Strategy to meet Phase II requirements; development of a State/EPA Agreement (including areawide planning area designation and planning delegations); preparation of water quality management plans; and revision of standards. The State agency has assigned personnel to further develop each of these components of the process.

## 2. Define Inputs to the Process

The next step in developing the continuing planning process is to define the relationship among existing water program activities and between water programs and other environmental and resource management programs. At this step, the mechanisms by which local government and the general public will participate in formulating and carrying out the State's water program should also be defined.

Example: The State has first classified its water program into the following categories: (1) program management, (2) standards setting, (3) plan development - analytic phase (this refers to water quality analyses and setting of effluent limits to meet standards), and (4) plan implementation mechanisms (these would include Section 402 permits, detailed facility planning and construction grants, and regulatory programs and implementing agencies required by Section 208). The interrelation of these aspects of the State's water program has been defined. The State Water Quality Management Plan provides the basic framework for setting water quality goals and making decisions which are implemented through the permit program, and provides design parameters for further facility planning and construction grants.

For each of the above water program categories, the State agency has identified the programs that should be coordinated with particular activities. For example, major environmental and resource management programs such as the air and solid waste programs, Coastal Zone Management Program, HUD 701 Program, and Federal land management activities should be coordinated with the water quality program at the stage of program design.

In terms of standards setting, there may be special relationships with other programs that involve designation of land and water for particular uses, e.g., the Coastal Zone Management Program, Wild and Scenic Rivers Act, Federal land management activities, etc. Plan development and implementation should be coordinated with corresponding phases of other environmental and resource management programs.

In order to seek involvement of the public as a whole in its water program, the State has developed a public participation program which consists of seminars and meetings on the State's overall management program and more extensive interaction with the public in each area in which water quality management plans are developed.

Finally, the State has developed a Policy Advisory Committee with representation of local elected officials. This Board oversees the State's management program. Similar local advisory groups have been set up for each planning area within the State.

### 3. State Strategy

The State Strategy should indicate the State's general approach to solving water quality problems and resource needs to carry out the approach.

Example: The State has indicated two general water quality problem situations: (1) complex pollution problems in urban areas involving many pollution parameters and many categories of sources and (2) specific problems involving a lesser number of pollution parameters and readily identifiable categories of pollution sources. The State has indicated that the complex problems require integrated planning for all pollution sources. Because of the important role of local government in resolving complex pollution problems, the State intends to designate these areas as areawide planning areas under Section 208(a)(2)-(4) of the Act. The State will conduct planning and implementation activities in other areas of the State. The resource needs for planning in these areas are also indicated.

### 4. Preparation of State/EPA Agreement

This stage of the process involves determining specific planning areas and tasks, agencies responsible for the tasks, including designation of areawide planning areas and agencies, and a timetable for planning.

Example: The State has already designated three urban areas for areawide planning. However, it was necessary in the State/EPA Agreement to spell out a more precise division of responsibilities for monitoring, wasteload allocation development and review by the State, coordination with further facility planning, and many other planning relationships. The State proposes to designate two more areas for areawide planning and has indicated in the State/EPA Agreement the planning tasks that would be carried out by the State and designated agencies in such areas. The State has also indicated the planning tasks to be carried out by the State water quality agency with the cooperation of other State and Federal agencies.

## 5. Revision of Standards

The State should indicate where present stream use classifications may require revision to protect existing instream water quality and where it is proposed that currently designated uses be upgraded to meet longer term water quality goals. In each case, appropriate criteria should be developed to be included in standards revisions, and the proposed revisions should be evaluated through the process of developing State Water Quality Management Plans to implement the standards.

Example: The State has proposed to include toxics and phosphorus under its standards for waters supporting warm water fisheries and to increase the stringency of the standard for total dissolved solids in waters classified as cold water fisheries to provide greater protection of trout during spawning. In addition, the State has chosen a design condition for wet weather flows and will initiate a monitoring program to determine whether standards are being violated under wet weather flows. Furthermore, the State has proposed that high quality waters in certain parts of the State be maintained at existing water quality levels and has proposed standards reflective of these levels. To meet longer term water quality objectives, the State has proposed for certain areas of the State an upgrading of designated uses from waters that provide maintenance of certain fisheries to waters that support propagation of this fishery, as well as body contact recreation.

## 6. Preparation of State Water Quality Management Programs

Responsibilities for preparing State Water Quality Management Plans should be indicated in the State/EPA Agreement. After portions of the State Water Quality Management Plan are completed, implementing agencies should be designated to carry out the plan.

Example: Certain portions of the State Water Quality Management Plan have been completed by existing designated areawide planning agencies. The State has designated implementing agencies pursuant to Section 208(a)(2) to carry out these plan elements.

## 7. Planning Process Review and Revision

States are required to review their continuing planning process annually and make revisions if necessary.

Example: The State has reviewed its existing planning process description and revised the process description in accordance with the changes needed to meet Phase II requirements. The State has held public hearings on the revised process description.

## B. State Water Quality Management Program Development

This guideline suggests a sequence of steps which may be followed to develop the plan elements required in Part 131 regulations. The following is a simplified version of these steps accompanied by some examples of how the steps might apply to typical pollution problems in urbanized portions of a State:

### 1. Identify Problems In Meeting 1983 Goals of the Act

The pollution problems should be identified in terms of their relative impact on water quality. Similarly, existing institutional problems impeding solution of water quality problems should be identified.

Example: To meet the 1983 goals of water suitable for fishing and swimming may require high levels of abatement for municipal and industrial point sources as well as nonpoint sources. Municipal and industrial point sources may present the worst problem under low flow stream conditions. It may be necessary to provide higher than national base level treatment for these sources in order to meet water quality standards. In the process of upgrading treatment for existing municipal sewage treatment plants and constructing new plants, the location of discharge points is an important variable affecting water quality. Treatment plant collection systems also influence where development will occur, which affects nonpoint source runoff. Finally, the design of treatment systems will need to include options for utilizing or disposing of the residual by-product of the treatment process.

Even after the point source problem has been solved, it is likely that rainfall-related sources of pollution such as urban runoff may cause severe stress on aquatic life due to the heavy metals and toxic substances washed into the stream.

In terms of institutional problems, the fragmented and small treatment works authorities in the area would have to join together to upgrade treatment levels to meet the 1983 goals. In addition, a management agency or agencies may need to be designated to establish a nonpoint source and residual waste management program, including local adoption of ordinances to require "best management practices" for various nonpoint source pollution generating activities.

## 2. Identify Constraints and Priorities

Both technical and management constraints on meeting 1983 water quality goals should be identified. Priorities for solving water quality problems should be established.

Example: From a technical standpoint, there may be reaches of streams in the area that cannot meet the 1983 goal. The goal may not be attainable, if a technological solution, for example, dredging sludge deposits from a river, would cause as many long term water quality problems as allowing the deposits to be naturally flushed out of the river over time. The development of State Water Quality Management Plans should provide information to help the State determine its policy on revision of water quality standards. A management constraint may be a lack of financial capacity to deal with a long standing problem such as drainage from abandoned mines. Priorities should focus on problems that can be most effectively solved within existing technological and economic capabilities. For example, renovating urban stormwater systems may be a low priority due to the high capital costs. On the other hand, establishing a treatment works program may be a very high priority. The State Water Quality Management Plan should specify a number of interim outputs such as service areas and treatment levels to provide an areawide perspective in further facilities planning.

## 3. Identify Possible Solutions to Problems

All reasonable regulatory and management control methods to reduce pollution to an acceptable level should be identified.

Example: Based on the State's existing and proposed water quality standards, a determination should be made of the levels of pollutant loading to streams that would not violate water quality standards. To meet the pollutant loading constraints for industrial and municipal sources, it may be necessary to consider larger regional treatment plants or pretreatment of industrial wastes prior to discharge to a municipal facility. However, the technical solution of a large regional treatment plant must also be feasible from an institutional standpoint. This would require preliminary analysis of management agency(s) and institutional arrangements for implementing a particular technical solution. Similarly, in the case of nonpoint sources, the overall feasibility of managing a particular problem should be investigated before the details of possible management practices are developed. For example, if improved street sweeping is thought to be an option for mitigating impact of urban stormwater, the practicality of changing parking schedules should be assessed from the outset. The regulatory measures for establishing "best management practices" for other nonpoint sources should also be identified. The authority for regulating certain activities (agricultural practices or mining) may not exist at the local level, and would therefore not be feasible unless enabling legislation were passed.

### 4. Develop Alternative Plans to Meet Statutory Requirements

Alternative technical abatement methods for municipal and industrial wastes, stormwater, nonpoint sources and residual waste, for both new and existing sources should be combined into areawide plans. Comparable alternatives for the implementation of the technical options through establishing waste management programs and regulatory programs should be identified.

Example: The technical alternatives for municipal and industrial wastes might include options for regionalization of treatment for municipal and industrial wastes, separate systems, or upgrading existing municipal systems. Waste treatment capacities of these alternatives should correspond to the projected land development pattern in the area. The residual waste disposal options would vary depending on the choice of treatment systems. Alternative management programs for construction, operation, and maintenance of the treatment works would have to be developed and include consideration of the financial arrangements for the local share of construction, the financing of operations and maintenance, and cost recovery and user charges. These assessments need only be as specific as the degree of detail undertaken in the State Water Quality Management Plan. The design parameters for facility planning developed in the State Water Quality Management Plan should be followed in detailed facility planning prior to award of construction grants.

Technical alternatives for managing nonpoint sources might include a series of alternative designs for attenuating the runoff from new urbanized areas, as well as alternative management practices for existing nonpoint sources in categories such as agriculture or mining. The management programs for implementing the design criteria for new stormwater and drainage systems would require proper enabling legislation, an agency capable of supervising the construction of new drainage systems, and adequate incentives such as tax advantages for adopting the management practices.

5. Analyze alternative plans

The alternatives should be evaluated according to the criteria of minimizing overall costs, maintaining environmental, social, and economic values, and assuring adequate management authority, financial capacity, and implementation feasibility in meeting water quality and carrying out the requirements of Sections 303(e), 208(b)(2) and (c)(2) of the Act.

Example: To meet water quality goals, the least cost strategy for abating municipal sources may involve a large regional treatment plant. This option would allow establishing a regional approach to sludge utilization through land application. Thus, this option would be environmentally and economically desirable. However, the option would involve constructing sewer interceptors through undeveloped land, which, unless land use controls were strictly applied, could induce further development. This option would involve the greatest institutional change, since it would require creating authority for regional financing of treatment.

For existing nonpoint sources such as urban stormwater, street sweeping might be less costly than attempting to treat stormwater. However, altering parking regulations to allow better sanitation would be disruptive to transportation. The alternative of separating some existing combined storm and sanitary sewers could be accomplished in the course of upgrading treatment plants, and might be the least cost solution for combined sewer overflow.

Adopting design standards for new drainage systems would help protect future water quality. The costs of these measures could be offset through tax breaks. The feasibility of implementing these design standards would depend on adequate staffing of the agencies responsible for supervising their enforcement.

6. Selection of a Plan

The selection should be based upon systematic comparison of the alternatives.

Example: Through a process of public involvement in the planning process, there should be general familiarity with options for meeting water quality goals. Having identified the least cost plan (where cost includes economic, social and environmental considerations), the units of government involved in recommending plan approval might also consider compatibility of the various alternative plans with other community goals.

7. Plan Approval and Program Implementation

Plan review and approval will be based on whether the plan demonstrates that the 1983 water quality goals specified in Section 101(a)(2) will be met and that the plan meets the requirements of Part 131 regulations. The Governor must designate management agency(s) having adequate authority and capability to carry out the plan.

Example: The plan demonstrates that the combined measures for abating point and nonpoint sources will be adequate for meeting standards. However, to the extent that some of the cause-and-effect relationships between nonpoint source problems and water quality cannot be documented, the approval of the plan should be contingent on development of plan performance assessment including an ongoing monitoring program. The management program meets the requirements of the Act for waste treatment and regulatory programs. However, some of the regulatory measures needed to implement the plan are in the form of legislative proposals before local governments in the area. The plan approval should be based on the condition that the regulatory measures will become law within a given time period. The State should monitor the progress of implementation and recommend or enact alternative measures if the original regulatory proposals are not adopted locally.

8. Periodic Updating of the Plan

A specific procedure should be defined for monitoring plan effects and developing annual revisions to the plan.

Example: The procedure for plan updating is that instream monitoring will be carried out by the management agency(s) to determine needed plan revision. The State will monitor progress of the management program and recommend specific actions needed to assure meeting water quality standards.

# CHAPTER 2

# CONTINUING PLANNING PROCESS DEVELOPMENT AND APPROVAL

## 2.1 Purpose

The purpose of the State's continuing planning process is to set up a management program and procedures to carry out water quality planning and implementation requirements of the Act. These requirements include standards setting and revision (§303(c)), preparation of State Water Quality Management Plans (§303(e) and §208), areawide planning and implementation (§208), annual assessment and projection of water quality (§305(b)), clean lakes (§314(a)), Federal/State estimate of publicly owned treatment works needs (§516(b)), and data for the Federal report on water quality (§104(a)(5)).

The continuing planning process is the State's management approach for organizing the activities that are undertaken to complete these requirements, as well as coordinating these activities with other programs undertaken in the State. In order to organize and coordinate water quality planning and implementation activities, procedures are needed to carry out the following functions:

- identify water quality problems
- establish the goals and standards for water quality protection
- delineate organizational and program responsibilities and interrelationships for planning and implementing solutions to problems
- establish the relationship between water quality management and other State programs and policies
- establish priorities, and resource commitments for water quality program activities.

Amended regulations on the continuing planning process (40 CFR Part 130) require the State to describe the elements to be included in the process by which the State carries out the previously discussed functions. However, the structure of these required elements, their timing and interrelations, are to be determined at the discretion of the State. The purpose of the process is to organize the State's water quality management activities. In general, the simpler the process by which decisions are made, the more efficient the process will be. Thus the process should have the fewest possible number of steps and relationships to carry out the basic functions described above.

## 2.2 Major Steps in Developing the Process Description

Part 130.10(a)-(c) specifies the general output requirements for a continuing planning process. The State's approach to meet each of these general requirements should be described in its continuing planning process submission. In order to provide a framework for discussion of the continuing planning process, these required elements can be arranged into the following major steps leading to the development of the overall process description:

- Process Design
- Provision for Inputs to the Process (coordination with other planning activities, public participation, intergovernmental input)
- Preparation of the Annual State Strategy
- Preparation of the State/EPA Agreement
- Preparation of the State Water Quality Management Plan
- Revision of Water Quality Standards
- Outputs - Description of Above Process Elements
- Process Adoption and Approval; Program Implementation

These major steps of the process are depicted on the following chart (Table 2.1) roughly in chronological order and proceed from the general to the specific. The chart does not depict all the interactions between the steps, nor does it depict the timing cycle of the various stages of the process. These features of the process should be defined by the States in their process submission. (A format for describing each of the process elements is provided in Table 2.3).

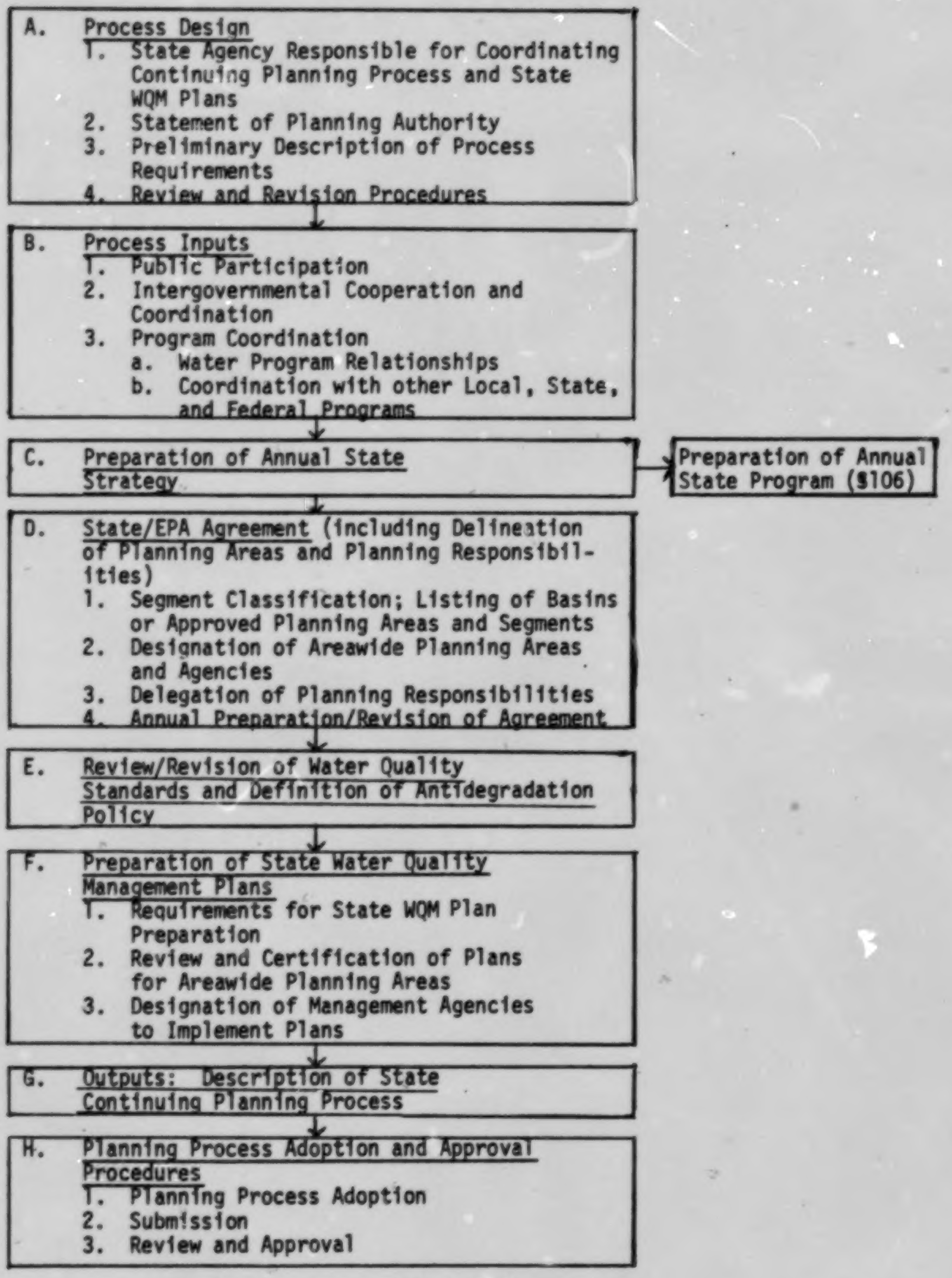
## 2.3 Detailed Guidance on Required Process Elements

This detailed guidance will discuss each requirement of Part 130 according to the framework depicted in Table 2.1. In cases in which the elements listed in Table 2.1 have further subheadings in Part 130, each of the subheadings will also be referenced and discussed in the guidance.

### A. Process Design

Process design should be the first stage of the continuing planning process. At this stage, an agency is chosen to be responsible for defining the elements of the process, including inputs, their relationships, and timing. In developing the process, procedures for revision of the process and elements of the process should also be specified. Process development includes definition of the following:

Table 2.1 State Continuing Planning Process
Major Steps and Process Elements



A. Process Design
1. State Agency Responsible for Coordinating Continuing Planning Process and State WQM Plans
2. Statement of Planning Authority
3. Preliminary Description of Process Requirements
4. Review and Revision Procedures

B. Process Inputs
1. Public Participation
2. Intergovernmental Cooperation and Coordination
3. Program Coordination
    a. Water Program Relationships
    b. Coordination with other Local, State, and Federal Programs

C. Preparation of Annual State Strategy

Preparation of Annual State Program (§106)

D. State/EPA Agreement (including Delineation of Planning Areas and Planning Responsibilities)
1. Segment Classification; Listing of Basins or Approved Planning Areas and Segments
2. Designation of Areawide Planning Areas and Agencies
3. Delegation of Planning Responsibilities
4. Annual Preparation/Revision of Agreement

E. Review/Revision of Water Quality Standards and Definition of Antidegradation Policy

F. Preparation of State Water Quality Management Plans
1. Requirements for State WQM Plan Preparation
2. Review and Certification of Plans for Areawide Planning Areas
3. Designation of Management Agencies to Implement Plans

G. Outputs: Description of State Continuing Planning Process

H. Planning Process Adoption and Approval Procedures
1. Planning Process Adoption
2. Submission
3. Review and Approval

### 1. State Planning Agency Responsible for coordinating the Continuing Planning Process and State WQM Plans (§130.10(c)(6)), (§130.12)

A single agency is to be designated by the Governor to be responsible for developing and submitting the continuing planning process, receiving input to the process, and making appropriate arrangements with other agencies which will have planning responsibility for developing portions of the State WQM Plan.

- Description of Agency

  In describing the lead State agency responsible for the continuing planning process and the State WQM Plan, information such as the name of agency, structure, functions, and budget should be presented.

### 2. Statement of Planning Authority; Statement that Implementation Authority Exists or Will Be Sought (§130.10(c)(11))

The planning authority of the agency chosen to be responsible for the continuing planning process should be clearly established in State statute. This agency does not have to possess implementing authority, but will have to identify management agencies that do have such authority to carry out appropriate portions of a State WQM Plan. At the time that a State agency is designated to carry out the continuing planning process, an investigation should be initiated of what general authority is needed on the part of the State or other levels of government to implement a State WQM Plan. Where enabling legislation is needed to establish the authority at the State or substate level to establish water pollution management and regulatory programs, the continuing planning process submission should specify how such implementing authority will be obtained.

- Description of Planning Authority and Needed Implementation Authority

  The continuing planning process submission should describe the following aspects of needed authority for planning and implementing State WQM Plans:

- existing authority for water quality planning
- water pollution problems for which adequate authority at State/local level exists to implement solutions
- water pollution problems for which existing State/local authority to resolve problems is unclear or insufficient
- legislation to be sought at the State/local level to provide adequate authority to resolve problems

As specific elements of State WQM Plans are developed, a more specific delineation of existing and needed authority will be possible. This information should be included in the designation of management agencies (§130.15) upon completion of the State WQM Plan.

## 3. Preliminary Description of Process Requirements (§130.10(a)-(c))

At this stage in the process, the overall structure of the elements of the process, their input, relationships and timing and revision procedures should be determined. When all the elements of the process have been completed, a description of the process can be prepared following the format suggested in Chapter 2.3.G.

## 4. Review and Revision of Process (§130.43)

The design of the continuing planning process should include specification of procedures for review and revision of the process. The process submission should include procedures for revising the following major process elements by incorporating results of the State WQM Plan:

- Process Design
- State Strategy
- State/EPA Agreement

It is not necessary to annually revise the entire continuing planning process design in order to incorporate new substantive information such as a revised State Strategy. It is only necessary to incorporate the revised substantive material into the structure set up for continuing planning.

## B. Process Inputs

The next step in developing a management program for relating water quality and other resource management programs is to define the mechanisms by which the general public and local elected officials will participate in the management program. Another initial step in the management program is to define existing water program relationships, and define other programs that have an impact on water quality. After describing the existing programs affecting water quality and existing forms of public participation and intergovernmental participation, modifications to these program and institutional arrangements should be proposed as part of the State's revised continuing planning process.

### 1. Public Participation

. Requirements of the Act (§130.10(a)(1))

Appropriate means for public participation must be provided at the major stages of the continuing planning process. One of these major stages which must include public participation is the State/EPA Agreement on level of detail and timing of the State WQM Plan. This element of the continuing planning process is especially important to the public, since it defines the strategy and work plan of tasks that the State will accomplish in implementing Sections 303 and 208 and other sections of the Act. Contact should be established as soon as possible with interested members of the public for the purpose of formulating a program of public participation to be carried out in the State WQM planning process. Appropriate forms of public participation must also be used in formulating the design of the continuing planning process as a whole. The Act's requirements concerning public participation are discussed in detail in Chapter 4, in which guidance is also presented on how to structure a program of public participation to meet these requirements.

. Institutional Alternatives in Setting Up Public Participation Programs

Since the State is responsible for the continuing planning process and the State WQM Plan, it is also responsible for carrying out requirements for public participation. However, since it is possible that certain planning activities will be delegated by the State water pollution control agency to sub-state levels of government, designated areawide planning agencies, another State agency or to Federal agencies, it is logical that public participation in planning should also be made the responsibility of the agencies delegated the planning function. A problem might arise, however, if accountability to the public for various elements of planning were divided among many agencies and units of government. It is thus necessary for one agency in each planning area--either the State agency or a designated areawide planning agency--to be ultimately responsible to the public for all public participation activities. In determining the State/EPA Agreement, the State agency should design a public participation program as described above, and specify which agencies would be responsible to carry out given participation activities within the larger program.

In order to make the channels of communication with the public very clear, the State should designate one person in the State agency to be responsible for the public participation program within the State.

### 2. Intergovernmental Cooperation and Coordination (§130.10(a)(2)), (§130.16)

#### . Adequate Input from Local and Regional Units of Government (§130.16(a))

In order to manage water quality planning and implementation activities for the State, the agency responsible for the continuing planning process should seek the advice of affected local and regional governments. This consultation is especially important in developing the State Strategy, State/EPA Agreement, and carrying out the State WQM planning responsibilities. This consultation is also essential in making decisions concerning designation of areawide agencies to undertake the 208 planning responsibilities within the overall State WQM Plan. Finally, consultation is needed to provide coordination between areas with designated 208 planning agencies, other agencies to which planning activities of the State WQM Plan have been delegated, and the State agency responsible for the continuing planning process.

#### . Institutional Arrangements (§130.16(b))

In addition to providing means for consultation between various levels of government, and in order to provide policy direction for the continuing planning process, the State should encourage coordination between various levels of government in water quality planning and implementation activities. The State should rely wherever possible on existing local, regional, State, Federal, and interstate units of government for carrying out the State WQM Plan. Further guidance on selection of these agencies and the importance of intergovernmental cooperation in plan implementation is provided in Ch. 9.

. Policy Advisory Committee (§130.16(c))

The purpose of an advisory group is to critique and aid planners in determining the best means to deal with water quality problems. The particular procedures for setting up an advisory group and making use of its views are left to the discretion of the State agency responsible for the continuing planning process. The State should exercise discretion and imagination in setting up advisory committee structures and procedures that best contribute to developing implementable water quality plans.

In order to clearly delineate responsibilities for receiving input from advisory committees, the lead State agency responsible for the State WQM Plan should develop a list of advisory groups (including proposed membership) at the time it establishes or revises the State/EPA Agreement and delegates planning responsibilities.

A policy advisory committee, including majority representation of locally elected officials*, affected Federal agencies and other interested organizations, including appropriate State agencies, is to be created. It will also be desirable to include representatives of the general public on the policy advisory committee. While the regulations only require one advisory group, it is strongly recommended that at least one advisory group be established for each planning area. Representatives from Federal land managing agencies should be included on such committees where Federal lands constitute a significant part of the planning area. The advisory committee should meet with the Agency responsible for the State WQM Plan in order to discuss and make recommendations on each of the following overall steps of planning: review of the EPA/State Agreement, establishment of objectives and analysis of problems, analysis of abatement measures and controls. consideration of alternatives, and plan selection.

Each advisory group should make any recommendations it feels appropriate to the planning agency responsible for the State WQM Plan in its area. The planning agency director should inform the advisory group of his actions with the advisory group recommendations.

. Policy Advisory Committee in Designated Areawide Planning Areas (§130.16(d))

In compliance with Section 304(j) of P.L. 92-500, the Administrator of the Environmental Protection Agency has entered into an agreement with the Secretaries of the Departments of Agriculture, Army, and Interior. Notice of Final Agreements was published in the Federal Register, Vol. 38, No. 225, November 23, 1973.

---

* Except where the Regional Administrator at the request of the State agrees to a lesser percentage of representation.

As a result of this agreement, the planning agency must create an advisory committee, with representatives of the Departments of Agriculture, Interior, and Army invited to participate. Each Department may or may not participate as it deems appropriate. This requirement provides for coordination of the programs authorized under other Federal laws with water quality planning.

Provisions should also be made for inclusion of representatives of the general public on an Areawide Policy Advisory Committee. The membership may be further expanded as considered appropriate by EPA and the State. A special effort should be made to include representatives of agencies responsible for other environmental programs being conducted in the planning area.

- Interstate and International Cooperation (§130.16(e))

The advice of affected adjacent States and Nations is necessary in conducting the continuing planning process. Consultation between the State agency responsible for the continuing planning process and other affected States could take place through existing organizations such as interstate basin commissions. International consultation should be undertaken through the U.S. Department of State. Where State WQM Plans are developed for interstate or international waters, an exchange of draft plans and comments on such drafts should be arranged between the appropriate parties.

### 3. Program Coordination (§130.10(a)(3))

#### a. Water Program Relationships

The State's water program is composed of a number of activities all of which should be coordinated to produce effective water quality management decisions. The following program relationships should be defined in the continuing planning process:

(1) Relationship to Monitoring and Surveillance Program

- State Monitoring Program (§130.30(a))

The minimum requirements for a State monitoring strategy and program are described in 40 CFR Subpart B, Appendix A. These regulations should be consulted in preparing the continuing planning process description so that the State's monitoring strategy and program may be coordinated with other program elements such as the preparation of State WQM Plans, the revision of water quality standards, and implementation of an antidegradation policy.

### . Stream Monitoring Needs for State WQM Plan Preparation (§130.30(b))

In general, monitoring information is needed for the following elements of a State WQM Plan:

| | |
|---|---|
| - water quality assessment and segment classification (§131.11(b)) including nonpoint source assessment (§131.11(d)) | -- This element of the plan should be initially based on existing data. Monitoring should, however, be undertaken to clarify gaps in existing data, especially for wet weather flow conditions, and parameters that might be included in revised water quality standards. |
| - inventories and projections (§131.11(c)) | -- Information on waste discharge from municipal and industrial sources is to be based on NPDES data and compliance monitoring. |
| - water quality standards (§131.11(e)) | -- Monitoring programs should be established to determine existing water quality where data is insufficient to determine the levels of water quality to be maintained through the State's antidegradation policy. Information on historic water quality is also needed to help determine natural background levels of pollution. |

- total maximum daily loads (§131.11(f)) -- Additional monitoring information may be needed to determine whether a segment is in fact water quality limited. Next, data on the rate of pollutant loading of significant point source dischargers and estimates of nonpoint source waste load rates to the segment may be needed to determine the total maximum daily load and relative contribution of point and nonpoint sources to a segment under both dry weather and wet weather flow conditions. Sufficient data is needed to enable reliable use of models. The models would then be used to establish point source waste load allocations.

The State should develop and describe its method for meeting each of the above needs.

- Groundwater Monitoring Needs for State WQM Plan Preparation (§130.30(c))

The State agency or other agencies delegated planning responsibilities should define those areas where groundwater problems exist or may exist in the future. The following criteria should be considered in determining areas where groundwater problems may exist:

- previous detection of concentration of pollutants in groundwater above the U.S. Public Health Service or appropriate State recommended standards for drinking water.

- presence of one or more of the following problems or activities (where these activities have caused significant problems in the past under similar conditions): waste disposal areas including land fills, land disposal of sewage or sludge, waste lagoons, deep well injection activities, subsurface excavation, leaching to groundwater from surface irrigation, pumping of groundwater in excess of natural recharge, leakage from underground transmission lines or septic tanks or concentrated animal feeding operations, anticipated new activities or problems such as one or more of those discussed above. Prior to a new activity which is suspected to cause an increase in groundwater pollutant concentration, the State should conduct a background survey to determine existing groundwater quality prior to initiation of new potentially polluting activities. The State should also determine whether authority exists, and attempt to gain authority, to require persons conducting such activities to conduct background surveys of groundwater quality.

The State should develop appropriate criteria for determining where it will undertake groundwater monitoring and describe the methods to be used to meet groundwater monitoring needs to support State WQM Plan development.

(2) Municipal Facilities (§130.34(b)), (§130.31)

. Relationship between State WQM Planning and Section 201 Facility Planning (§130.34(b))

Pursuant to Part 131.11(h), the State WQM Plan is to include certain elements of planning for municipal collection and treatment systems. Guidance on this element of the State WQM Plan is presented in Ch. 3.6 and Ch. 8. The following facility planning outputs should be summarized in State WQM Plans for any facilities expected to receive a construction grant award during the five years following initial plan approval:

- delineation of service areas and population to be served
- preliminary estimate of municipal wastewater flows over the twenty year planning period
- preliminary identification of alternative treatment systems
- preliminary specification of infiltration/inflow problems and possible solutions; preliminary specification of sludge disposal or utilization options
- preliminary cost estimates for collection, treatment, infiltration/inflow correction and sludge utilization or disposal
- proposed program for financing above measures
- preliminary determination of which alternatives are likely to be most cost-effective.

These outputs are to utilize approved 201 and 208 plans where available. Where these outputs have not been or will not be developed through 201 or 208 planning, they are to be developed as part of the State WQM Plan.

- Consistency of Approved State WQM Plan Outputs with Facilities Program (§130.31(a), (b))

After the State has approved the municipal facility element pursuant to §131.11(h), further Step 1, 2, and 3 facilities grants are to be consistent with the approved facility outputs. Further facility planning and construction grants may only be made to the management agency(s) designated pursuant to §131.11(o) to implement the facility portion of the State WQM Plan. The Regional Administrator is given the responsibility for making the consistency determination.

- Incomplete Municipal Assessment--Relationship with Facilities Program (§130.31(a), (b))

Where the municipal facility outputs required under Part 131.11(h) are not complete and approved, the Regional Administrator may elect to delay approving a facilities planning or construction grant until an adequate assessment of the needs and priorities of the area has been developed.

- Timing of Facilities Assessment (§130.31(d))

Because the facilities outputs required in §131.11(h) are critical for maintaining an integrated program for facilities planning and construction, these outputs should be timed in accordance with construction priorities in the State. The EPA/State Agreement should be closely coordinated with the State's facilities program.

### (3) State Participation in NPDES Program (§130.32(a), (b), (c))

The State's participation in the NPDES program is contingent upon having an approved continuing planning process. In addition to process-approval, the various activities of the continuing planning process must be carried out according to statutory time schedules. Once the plan or portions of the State WQM Plan are approved, point source permits must be consistent with these plans. See Chapter 3.10 for the procedure for State WQM Plan adoption.

. Timing of State WQM Plan Completion and Permits

The completion of the State WQM Plan is needed in water quality limited segments to provide wasteload allocations for dischargers requiring permits. Every effort should be made to complete water quality analyses and wasteload allocations for those areas of the State where it is expected that higher than base level controls will be needed to meet water quality standards. Schedules for completing these analyses should be phased according to the timing of NPDES permit renewal as well as construction grants. High priority should also be placed on completing water quality analyses in areas where major new industrial location is expected. These timing considerations should be carefully considered in developing the State/EPA Agreement.

### (4) Designated 208 Areawide Waste Treatment Management Planning Program Relationship (§130.33(a))

The State is responsible for developing the total State WQM Plan. The principal components of the plan are:

- Water Quality Analysis Program
  - Water Quality Assessments (including nonpoint source assessment) and Segment Classifications
  - Inventories and Projection of Dischargers
  - Revision of Standards
  - Total Maximum Daily Loads
  - Wasteload Allocations

(Note: These requirements stem from Sections 303, 305(b), and 314 of the Act.)

. Water Quality Implementation Program

  - Municipal and Industrial Treatment Works Program*
  - Urban Stormwater Management Program
  - Residual Waste Management Program
  - Nonpoint Source Management Program
  - Target Abatement Dates
  - Regulatory Program
  - Management Agency(s) and Institutional Arrangements to Supervise and Finance Plan Implementation

(Note: These latter requirements stem primarily from Section 208 of the Act.)

The first set of elements provides technical direction for the State WQM Plan in the form of water quality goals and evaluation of permissible levels of pollutant loading in receiving waters, while the second set of elements involves a determination of particular abatement measures, regulatory controls and financial and management arrangements to meet the water quality goals. These two sets of plan elements are logically interrelated.

The State may designate areawide planning agencies to carry out the latter elements and provide much of the analysis needed by the State to finalize the former elements. In areas which are not designated as areawide planning areas, the entire State WQM Plan for that area is to be completed by the State. Nevertheless, the State may delegate (if these agencies agree) portions of the planning to sub-state or Federal agencies. In the State/EPA Agreement for each area, the State must identify the agency responsible for each of these planning elements.

. Coordination of Areawide Planning and State WQM Development (§130.10(c)(8); §130.33(b), (c))

Since the designated areawide planning agencies will play a key role in completing the State WQM plan, they should be consulted by the State agency responsible for the continuing planning process in the formulation of the process and especially in the State Strategy and EPA/State Agreement. The EPA/State Agreement is the basis for establishing the precise division of responsibilities for the various elements of the State WQM Plan. Since the water quality analysis elements of the State WQM Plan are critical to completing designated areawide plans, the EPA/State Agreement must specify how the State will ensure completion of these elements in phase with the needs of designated areawide agencies in time to meet the 1983 water quality goal and should indicate the milestones that the State will use to monitor the progress of planning conducted by areawide planning agencies. The State/EPA Agreement should also specify how areawide planning will be coordinated for interstate waters.

---

* This refers to the requirements of §131.11(h), (i). The relationship between facility planning outputs developed in the State WQM Plan and completion of the Step 1 facility planning requirements is discussed in Chapter 3.6 and Chapter 8.

Due to time and resource constraints, the State may delegate some of the analytic elements of the State WQM Plan (inventories and projections, maximum daily loads, wasteload allocations, schedules of compliance) to designated agencies for completion, subject to State review. Whatever division of responsibilities is established between the State and designated areawide planning agencies, the plan elements developed by areawide agencies should be reviewed for consistency with the State WQM Plan and incorporated into the State WQM Plan after review and certification as specified in §131.20(f). Guidance on determination of consistency of designated areawide plans with the State WQM Plan is found in Chapter 3.10. In the case of nonpoint source planning, the State has the option under Section 208(b)(4) of pre-empting the nonpoint source planning and implementation in designated areas. In order to present the minimum of uncertainty to the designated area planning process, the State should establish its intentions regarding nonpoint source planning in the State/EPA Agreement.

### b. Coordination with Other Local, State, and Federal Planning Programs (§130.34)

Water quality management is affected by policies concerning land use, regional development, and many planning activities carried out in a State. Information concerning these policies and plans is needed as an input to the State continuing planning process and State WQM Plan. The effect of these policies and plans on attaining water quality objectives should be evaluated. In addition, it is necessary to consider the impact that the water quality management plan may have on other plans and policies of the State. The following guidance suggests some of the program relationships that should be defined in the State's continuing planning process submission. (Guidance on techniques for coordinating water quality and other planning activities is further discussed in Chapter 12.)

### (1) Relationship with EPA Solid Waste Programs

Section 208(b)(2)(C) calls for regulatory programs over all dischargers, as well as processes to control disposition of residual waste and disposal of pollutants on land or in subsurface excavations. The specific coverage of these elements of State WQM Plans is discussed further in Chapter 3. Thus, solid waste and sludge disposal regulation for water quality protection is needed in a State WQM Plan. The Solid Waste Disposal Act as amended authorizes the preparation of State solid waste management plans. These plans provide for locational decisions and management of land disposal of solid wastes. In developing programs for dealing with water pollution from solid waste and residual disposal, State plans for solid waste management should be examined for recommended organizational and technological solutions pertaining to the affected area. State solid waste management officials and local agencies with primary responsibility for regulating and implementing solid waste management controls have expertise in this area and should be consulted when developing a management program. The effects of the management program should be considered and appropriate measures taken in cooperation with local agencies to ensure compatibility between the water quality management provisions and solid waste management within the area.

### (2) Relationship with EPA Air Quality Programs

#### . State Implementation Plan

All States are required under the Clean Air Act, to develop and implement State Implementation Plans (SIP's) which will meet and maintain the National Ambient Air Quality Standards (NAAQS). Measures and procedures that would be included in the SIP are:

- Stationary Source Review
- New Source Performance Standards (NSPS)
- Federal Motor Vehicle Control Program (FMVCP)
- Transportation Controls
- Air Quality Maintenance Planning

Many of the control strategies developed under the SIP will affect land use and development decisions. For example, transportation controls involving mass transit require certain population densities to be effective. The State should make sure that population projections and control strategies developed under the SIP are consistent with those for the State WQM Plan. To assure consistency, the State should encourage frequent communication and exchange of information between the agencies responsible for the two plans, provide for integration of data requirements and plan elements when practicable, and resolve conflicts in policy which may develop between the two plans.

. Air Quality Maintenance Planning

Air Quality Maintenance Planning (AQMP) is a part of the SIP that is required for areas where it has been determined that the NAAQS will be exceeded within the subsequent 10-year period. The State must submit a plan containing stricter control measures that will ensure the maintenance of the standards. The plan is updated at least every 5 years. In many areas, AQM areas overlap or are essentially the same as designated areas, in which case the planning for the AQM area should be closely coordinated with the areawide planning. If the planning boundaries for the State WQM Plan include planning area(s) with boundaries similar to that of an AQM area, planning within the planning area(s) should be closely coordinated with the planning for the AQMP. Representatives of the AQM planning agency should be on advisory groups, and there should be periodic reporting and exchange of information between the agencies designated to do the State WQM Plan within a planning area(s) and the planning agencies responsible for the AQMP.

### (3) Relationship with Programs under the Safe Drinking Water Act

A number of important relationships exist between programs under the Safe Drinking Water Act (SDWA) and the Preparation of State WQM Plans. While exact program relationships are still being defined by EPA, the States should describe existing areas of overlap between their water supply programs and State WQM Plan. The States should seek the advice of EPA Regional Offices concerning future relationships with programs authorized under the Safe Drinking Water Act.

The following are some of the major program relationships between water supply and water quality planning that should be defined:

| | |
|---|---|
| . Water quality standards and drinking water standards - | The State should define in its water quality standards revision process pursuant to §130.17, how water quality standards policy will be coordinated with existing and proposed State law regarding drinking water or water intake standards. |
| . Siting of public water supply - systems | The State should define how regulatory programs over location of waste discharging facilities pursuant to Section 208(b)(2)(C) of the Act will be coordinated with existing or proposed State law regarding location of public water supply facilities. |
| . Protection of aquifer recharge - areas | The State should define how point and nonpoint source regulatory programs to be undertaken pursuant to Section 208(b)(2)(C) of the Act will be coordinated with existing or proposed State law protecting sole source aquifers or aquifer recharge areas. |
| . Underground injection of pollutants - | The State should indicate how regulatory programs for deep well injection or subsurface disposal of pollutants required pursuant to Sections 208(b)(2)(C) and 208(b)(2)(K) of the Act will be coordinated with other existing or proposed State law concerning protection of water supply. |

### (4) Relationship with Level B Studies

#### . Program Coordination

Section 209 of the FWPCAA authorizes the preparation of Level B plans for all basins in the United States. These plans are to analyze water and related land resources management problems and serve as a basis for recommendation to Congress of priorities for "investigation, planning, and construction of projects" (42 U.S.C. 1962(b)).

In order to minimize collection of new data in preparation of a Level B plan, maximum utilization should be made of on-going State planning programs. A portion of State input to Level B studies can be provided through these programs, but only if complementarities are identified. States should work to coordinate their State WQM Plan with any Level B planning occurring within their State, and provide the agencies responsible for Level B planning with needed water quality inputs. In addition, the States should work with the Level B planning agency to assure that adequate attention is given to water quality objectives, expecially in areas with major nonpoint source pollution problems.

Level B plans can assist State WQM Plan efforts by facilitating interstate consistency in development and application of nonpoint source control measures, and by providing a mechanism to identify responsibilities of Federal agencies (through their involvement in Level B planning) to eliminate or ameliorate point and nonpoint source pollution.

. Specific Program Relationships (§130.34(c))

Where Level B studies are being conducted or have been completed, outputs of these studies should be incorporated into the State WQM Plan. These outputs are listed in Part 130.34(c)(1)-(7). Guidance on incorporating these outputs into the State WQM Plan is discussed below:

- Existing and Projected Water Withdrawals and Consumptive Demand

This information should be related to municipal and industrial wastewater flow projections (§131.11(c) of the State WQM Plan) especially where availability of water is a limiting factor in future development of an area. Information on future surface and groundwater supply should be related to water quality (including salt water intrusion and salinity) assessment and pollution control needs in the State WQM Plan.

- Water Supply Facilities, Effects on Water Quality

Where water supply facilities are projected, an analysis of their effect on water quality should be included in the State WQM Plan. The analysis should include assessment of the impact of water treatment processes (and associated residuals) on instream water quality.

- Water Development Measures, Watershed Management

The water quality impact of existing and proposed hydrologic modifications and management measures (dams, impoundments, levees, channelization) should be included in the water quality analysis conducted in the State WQM Plan where such developments have a substantial impact on water quality and pollution control needs.

- Wild and Scenic Rivers

Where proposals are made in Level B studies for Wild and Scenic Rivers designation, or where such designations have been made, the State should develop appropriate water quality standards (including antidegradation policy) and implementation measures in the State WQM Plan, in order to protect the rivers that are so designated.

- Energy Development

Where energy development affecting water quality or quantity is projected, appropriate pollution control considerations should be incorporated into the State WQM Plan.

. Future Level B Studies §130.34(d)

Where Level B studies have not been initiated to the extent that information is available, an analysis of the effects of the foregoing water development and conservation projects on water quality should be developed in the State WQM Plan as an input to future Level B studies.

### (5) Relationship with Other State and Federal Programs

A number of Federal agencies are involved in programs which are related to the State WQM Plan. These may be classed as either grant programs or management and technical assistance programs. Examples of the former are the HUD 701 program, the Coastal Zone Management program under NOAA, and DOT transportation plans. Examples of the latter are the activities of the Army Corps of Engineers, the Soil Conservation Service and the Forest Service. Other planning and implementation activities may be carried on at the State level in addition to those funded through Federal programs. Included among these would be the programs of State soil and water conservation agencies, natural resources departments, fish and wildlife agencies, agricultural departments etc.

Since the planning efforts of these various programs may have direct interrelationships with the planning done for the State WQM Plan, especially in the area of land use, steps should be taken to ensure that there is consistency between the plans. Coastal Zone Management Plans, for example, determine permissible and priority land and water uses for coastal areas of a State. HUD 701 Plans similarly include a land use element. Such land use policies must be consistent with the maintenance of water quality and nonpoint source controls which would affect land use. Guidance on techniques for plan coordination may be found in Chapter 12.

In addition to planning efforts, other Federal agencies are directly involved in programs within the States which relate to the State WQM Plan. Many of the Corps of Engineers activities, for example, can have a significant effect on water quality. In addition, the Corps provides technical assistance which can be of use to a State preparing a State WQM Plan. One way this is done is through the Corps' Urban Studies Program which is concerned with urban water resources problems, including wastewater management. In addition, the Corps is specifically directed to provide technical assistance for areawide planning (Section 208(h) FWPCA). EPA and the Corps have developed an agreement which specifies the coordinating and funding policy regarding this assistance.

Other Federal land and water managing agencies such as the Bureau of Land Management and the Bureau of Reclamation should be contacted by the State in order to work out specific arrangement for developing water quality management plans for Federal lands.

Other Federal programs can also be of use to the States in preparing their State WQM Plan. The Soil Conservation Service of the Department of Agriculture can provide technical assistance in the assessment and control of nonpoint sources, especially those resulting from uses which can cause soil erosion. In addition, all of SCS administered programs are implemented through local Soil and Water Conservation Districts. These conservation districts, which are legal subdivisions of state government established under state law, have the responsibility for planning and carrying out erosion control and related conservation programs. With the assistance of their cooperating agencies, they can help provide information on nonpoint source control techniques, provide technical assistance in planning for utilization of such techniques, and assist in implementation of the measures. In some states, the districts have plan approval and other responsibilities in connection with mandatory State and local sediment control programs.

The Forest Service, as land managers, needs to establish cooperative planning relationships with each State that has U.S. forest lands. The State should develop specific agreements with the Forest Service on how to relate its watershed management program to the State WQM Plan. EPA can assist in establishing the necessary relationships. The Forest Service does provide technical and financial assistance to the States for the administration of State and private forest lands. These programs should be coordinated with the State WQM Plan.

Other Department of Agriculture programs include the Agricultural Conservation Program administered by the Agricultural Stabilization and Conservation Service which can supply cost-sharing assistance for many of the Best Management Practices that may be necessary to control runoff and reduce sedimentation from farms. Technical assistance for this program is given by the Soil Conservation Service and Forest Service.

In summary, the State should determine the relationship between water quality and other planning programs within the State, ensure consistency between the plans, and work with Federal programs to make use of their technical expertise.

## (6) Planning Requirements for Federal Properties, Facilities, or Activities §130.35

### . Compliance with State and Local Pollution Control Requirements §130.35(a)

The State holds ultimate responsibility for ensuring that the WQM Plans are prepared and implemented throughout the State. Federal facilities and in some cases large holdings of federal lands are found in practically all States. Pollution control requirements for federal facilities and lands are stated in Section 313 of the Act, Executive Order 11752 and 40 CFR Part 130.35. The Executive Order requires compliance by federal facilities with Federal, State, interstate, and local substantive standards and limitations dealing with the control of environmental pollution. State water quality standards, effluent limitations and discharge permits are specifically cited as substantive requirements. Compliance with other requirements including land use requirements or best management practices are not specifically cited as substantive requirements. Thus Federal agencies are required to meet State water quality standards but are given latitude to define their approach to meeting these standards.

Point sources are subject to NPDES permits. For Federal sources EPA is the permitting authority. For non-Federal sources on Federal lands, the State issues the permits after EPA approves the State's permit program. Under Executive Order 11752, the Federal Land Manager (FLM) determines what is a Federal or non-Federal source on his lands. The agency with State water quality management point source planning responsibilities for Federal facilities or lands should work with the FLM to delineate which types of sources are Federal and which are not. In general Federal sources should be those operated by the Federal agency or in behalf of its mission. Non-Federal sources would include effluents from activities carried out on Federal lands under lease or permit (timber harvesting, mining, recreational cabins, ski lodges, etc.).

Where meeting the substantive requirements of State water quality standards will require land management controls, as may be the case with nonpoint source pollution, these controls would be considered procedural for the purposes of Executive Order 11752. Thus, the FLM would be responsible for development and enforcement of such controls. However, such controls would have to be at least as stringent as State/local controls for adjacent lands with similar kinds of problems and characteristics in order to provide needed levels of pollution abatement.

. Federal-State Cooperation in Plan Development (§130.35(b)-(d))

Federal lands are an area of overlapping responsibility since the State is responsible for developing nonpoint source abatement measures to protect water quality and the FLM is responsible for meeting water quality standards following this plan or any other effective approach. In order to avoid duplication of planning, it is EPA policy to encourage the development of cooperative agreements between the State and appropriate FLM. Such agreements should outline the responsibilities of both the State and the FLM in developing and implementing the controls necessary to meet water quality standards on federal lands including participation of the FLM on the State Water Quality Policy Advisory Committee, and other policy advisory committees for planning areas within the State, development of Best Management Practices, and establishment of any necessary implementing, operating, or regulatory programs. If no agreement can be reached the differences will be mediated by EPA and, if necessary, by the Office of Management and Budget.

All expenditures necessary to plan for and implement point and nonpoint source controls for Federal sources are to be included in the budget of the FLM. Under the provisions of Section 313 of the Act, no exemptions shall be granted due to lack of appropriation available. This does not preclude contractual arrangements between the State and the FLM for technical planning assistance.

## C. Preparation of Annual State Strategy

### 1. Purpose

The State Strategy is the management device used to define water quality problems Statewide, prioritize the control of those problems, schedule the corrective measures to be taken, and generally project the resources needed to accomplish the tasks. Thus the State Strategy provides direction for preparing the Annual State 106 Program.

### 2. Relationship to National Program Guidance (§130.20(a))

Prior to the development of the State Strategy, each State will be provided with the National Strategy and National Operating Guidance developed by EPA. These two documents set out the basic objectives and priorities of the National Program and should give the States enough information to construct their own individual Strategy, integrating the essential requirements of the National Program, while incorporating more localized State needs. The Regional Offices will assist the States in producing the proper balance.

3. Contents of Strategy:

- Input to Strategy

In gathering the information needed to develop an annual State Strategy the following information should be consulted:

- completed or ongoing State WQM Plans
- inputs for development of State WQM Plans (described in Ch. 3.5)
- other planning activities related to water quality and water resources (described in Ch. 2.3.B)

- Problem Assessment (§130.20(a)(1))

The first step in the development of the State Strategy is the consolidation of available water quality data to assess water quality problems Statewide. The best way to aggregate the data is by stream segment. The quality of the waters of a segment should be defined at stream monitoring stations within that segment. Each segment should be analyzed on the basis of the criteria set forth in approved water quality standards to ascertain the segment's ability to provide for a balanced population of fish, shellfish, and wildlife and for recreational activities. The State may find that present water quality conditions could be more appropriately analyzed at the basin or sub-basin levels. However, for consistency at both the national and State levels, each State should attempt to aggregate water quality data at the segment level.

The State's annual water quality inventory report (305(b) Report) requires much of the same water quality assessment data as the State Strategy. Since the 305(b) Report is intended to be far more comprehensive than the Strategy's problem assessment, the relevant aspects of the 305(b) report should be used to constitute the problem assessment. EPA has previously provided the States with guidelines for the development of the 305(b) report which should be consulted. After the water quality assessments required under §131.11(b) and (d) have been developed, this information should be used in preparation of the Annual State Strategy as well as the 305(b) report.

- Priority and Ranking (§130.20(a)(2))

Based on the water quality assessment, each segment within the State should be ranked in order of priority. This may have been done previously in Phase I Plans. From the water quality management plans completed in the past two years, and from routine or intensive monitoring activities, the State may be in a position to more accurately assess problem segments, and to some degree, amend the original ranking. Generally, water quality limited segments should receive a higher rank than effluent limited segments. The complex nature of a water quality limited segment may require a longer time frame required to control pollution in these segments.

The water quality assessment should yield most of the information needed to rank the segments. However, extent of pollution problem may not necessarily be the only factor used for purposes of ranking segments. Preservation of high quality waters, the size of the population being affected by a pollution problem, or other appropriate criteria may be used also. There is no specified weighting which any of the chosen criteria should receive except that the State should generally consider control of its worst pollution problems first.

The ranking of segments should be used together with the municipal treatment works inventory developed pursuant to §131.11(c) to formulate the State's project priority list required in §35.915(c). Project priorities should reflect both the severity of pollution problems in different segments (e.g. segment ranking) and the severity of pollution problems caused by municipal facilities (e.g. municipal inventory ranking).

- Approach to Solving Problems (§130.20(a)(3))

After the State has completed the ranking of each segment, another required step is development of an overview of the State's approach to solving its water quality problems.

The overview should highlight only the most significant pollution problems and the State's approach to solving them. This information should be readily available from completed water quality management plans, or where there are none completed, from ambient monitoring data. The overview is intended to focus concern on the type of pollution problems which generally exist in each basin or geographic area of the State.

In developing its overview, the State should decide which basins or geographic areas exhibit pollution problems of most immediate concern and which areas will receive the major concentration. For example, municipal point source controls may suffice, or a difficult nonpoint source problem may dictate intense research and additional monitoring. As nonpoint problems are exceedingly difficult to control, the State should construct a realistic long-term strategy utilizing all available water quality data.

- Scheduling of Programs (§130.20(a)(5))

After basic problem identification has been cited, basin or geographic priorities listed, and a general approach to alleviating the problems conceptualized, the State must describe program activities to implement the general scheme.

A crucial aspect of scheduling program activities is their timing. Each water segment should have the various activities coordinated in proper sequence. Any facilities planning, permitting, construction, monitoring, or enforcement should be planned so that the actions taken may be mutually reinforced. Planning should generally be completed prior to other actions being taken. Municipal construction (grant award) should be closely coordinated with any permit activities. Any necessary action which the State plans call for over the next five years should be clearly spelled out with proper phasing indicated. This provides a mechansim by which the State can better assess the objectives necessary to upgrade water quality in each segment and ascertain the resources needed to implement these various activities.

- Program Resource Needs (§130.20(a)(4))

A necessary element in a definition of water quality problems and solutions is an estimate of the resources that will be required to implement corrective actions. Such estimates should be consistent with a State's Water Quality Management Plan, and cover a time frame of sufficient duration to indicate a relationship between planned actions and resource utilization. Once determined, these resources estimates will provide a basis for continuous program planning and budget justification.

Each State is required to prepare and update annually a year-by-year, five (5) year estimate of the resources needed to conduct the State program. These estimates should be detailed by major program element for the financial and man-year resource requirements for each year. Greater detail may be appropriate for the first year resource estimates. A description of the method or methods used to determine estimates and projections over the five year period should be included to indicate the relationship of future resource requirements to future achievements.

Since the result of this resource estimation is important in effective program planning and budget justification, the methodology used should be sufficiently rigorous to assure a meaningful statement of need. EPA will provide guidance on alternative methods for preparation of these resource estimates and projections.

- Monitoring Strategy (§130.20(a)(6))

Refer to the discussion of monitoring found in Ch. 2.3.B.3.

4. Submission of Strategy (§130.20(b))

The annual State Strategy should be submitted as part of the continuing planning process annual program submission (see Ch. 2.3.H). Both the annual State Strategy and any revisions to the continuing planning process should be submitted with the Section 106 Program Submission.

### D. Preparation of State/EPA Agreement Including Delineation of Planning Areas and Planning Responsibilities

Based on the information in the State Strategy, a specific agreement on planning responsibilities and tasks is needed in order to carry out the State WQM Plan. This agreement must be submitted within 150 days after the effective date of the Part 130 regulations as part of the State's continuing planning process submission. The agreement is to be reviewed annually and revised if necessary as part of the annual planning process review (§130.43).

In order to specify the planning tasks and responsibilities in the State/EPA Agreement, the State should determine the areas where various forms of planning are needed and the agencies that might be delegated planning responsibilities in these areas. The following are some of the steps leading to development of the Agreement:

1. Segment Classification; Listing and Maps of Planning Areas and Segments (§130.10(c)(2), (3))

The continuing planning process submission must delineate planning boundaries, including segments within those boundaries, where the planning activities required in Part 131 are to take place. It must be recognized that this delineation of planning areas depends on accurate assessment of water quality problems and segment classification. However at the time of submission of the revised continuing planning process, it may not be possible to definitively classify effluent limited and water quality segments due to the following factors:

- lack of definition of water quality standards to achieve the 1983 goals
- inadequate data on the high flow-wet weather problems caused by nonpoint sources

. Segment Classification

The initial delineation of segments should be based on best available information and may require further refinement. However, the following segment delineation could probably be made notwithstanding the lack of information concerning the factors discussed above:

- Where segments are now classified as water quality limited, due primarily to point sources for which effluent limitations for 1977 and 1983 do not differ to a very large degree (example: municipal treatment requirements), the probability is that the segment will remain water quality limited.

- Where increase in waste loads is expected to exceed the assimilative capacity of the stream after application of effluent limitations required by 1983, the segment should be classified as water quality limited.

- Where a segment is now water quality limited, with substantial nonpoint source or stormwater discharges, it should be tentatively classified as water quality limited.

- Waters which are above standards and in which no degradation will be allowed should be classified as water quality limited.

- Where the existing classification is effluent limited and antidegradation policy will not be applied, assuming no large nonpoint source problems, and assuming a moderate amount of growth, the segment may be tentatively classified as effluent limited.

- Areas where the State intends to certify pursuant to §130.11(b) that no pollution problems exist, or will exist over the planning period, could be classified as effluent limited.

. Planning Area Selection

The tentative segment classification will indicate where different levels of water quality exist in the State. Based on this information, planning areas can be delineated for carrying out the State WQM Plan.

The revised Part 130 regulations provide flexibility in the choice of planning area. The following are approaches to delineate planning areas that may be used singly or in combination:

- hydrologic boundaries -- Certain of the requirements of the State WQM Plan (segment classification, calculation of total maximum daily loads) should generally be carried out according to hydrologic units.

- political boundaries -- Political units may be used as planning areas for carrying out the requirements of the State WQM Plan with respect to development of abatement measures.

Under either of these approaches, the State can be divided geographically into mutually exclusive planning areas. However, it is possible to interpret planning area as referred to in §130.11, to mean any area for which planning for particular problems is conducted. Under this latter interpretation, it is possible for one form of water pollution problem to overlap with areas having other forms of water pollution. The State may delineate both mutually exclusive and overlapping areas and subareas. However, some requirements, such as the water quality analyses and determination of maximum allowable pollutant loads need to be conducted for single, mutually exclusive, areas of the State. The following are factors to consider in determining whether to delineate areas for various forms of planning:

- Area versus category approach

Once water quality analyses including calculation of total maximum daily loads and wasteload allocations have been developed, there are two basic alternatives for developing abatement strategies to meet these wasteload constraints within given planning areas.

The area approach involves simultaneous development of alternative abatement measures for all sources within the planning area. To carry out this approach requires developing estimates of pollution generation for each unit of land in the planning area and consideration of alternative abatement measures for such units. This approach depends on developing a great deal of information on the problems of an area before considering abatement alternatives. The advantage of the approach is that by developing a comprehensive analysis of all the problems of an area, it is possible to consider the cost effectiveness of alternatives between abatement of various point and nonpoint sources. This approach is presented in greater depth in Ch. 6.

The category approach involves delineating subareas within a planning area where particular forms of pollution or pollution generating activity occur, and developing abatement measures for each of these pollution sources, one at a time. The level of abatement for each source should be based on the water quality analysis (conducted on a hydrologic basis). This approach enables focusing on priority problems and developing immediate solutions without having to consider the interaction and cost effectiveness tradeoffs among all the abatement alternatives. Under this approach it is possible that one geographic area will be in a planning subarea for various forms of pollution. It is also possible for the subareas to overlap. Planning procedures based on this approach are further discussed in Ch. 3.6.

- Areas where planning is not required

Whichever of the above approaches (or combination of approaches) for planning area delineation is used, it is possible that there will be areas where the State can certify, pursuant to §130.11(b) that no pollution problems exist (see discussion of this certification procedure on page 2-35). While it is conceivable that the State would delineate these areas along political jurisdictions, it could even choose those areas where no particular form of pollution exists to be delineated along hydrologic boundaries.

In addition to technical considerations, institutional factors should be kept in mind in determining how to delineate planning areas. Part 130 regulations require institutional coordination including adequate intergovernmental input, public participation, and coordination with other planning activities. In addition, a State/EPA Agreement on level of detail and timing should be developed for each planning area. This places practical limitations in the approach of having overlapping planning areas. Consequently, where complex water quality problems and institutional constraints exist to Statewide planning, the area level planning approach is probably more feasible.

### 2. Designation of Areawide Planning Areas and Agencies; Description of Existing and Proposed Designations (§130.13); (131.10(e),(f))

Where the State chooses to delegate major planning responsibilities for development of the State WQM Plan to a single representative agency, the State should consider designating the area as an areawide planning area pursuant to Section 208(a)(2)-(4). Guidance on the procedures and criteria for designating such areas will be contained in a separate handbook entitled "Area and Agency Designation Handbook." This handbook will be available through the EPA Regional Offices. This handbook indicates the information to be submitted to EPA in describing proposed areawide planning agency designations.

### 3. Delegation of Planning Responsibilities (§130.10(c)(9), §130.14)

- Planning Responsibilities (§130.14(a))

As part of the work plan established in the EPA/State Agreement on level of detail and timing, and the delineation of planning areas discussed above, each agency having responsibility to carry out an element of the work plan within a given planning area should be so designated. Consistent with the alternatives for planning area delineation, planning responsibilities may be delineated on an area basis (example: all of the approved planning area or basin) or on a category or problem basis (example: municipal facilities, or a given nonpoint source category within an approved planning area). However, certain tasks such as the basic water quality analysis are not easily divisible and should generally be carried out by a single agency.

Whatever division of planning tasks is followed in a planning area, the State remains responsible for the integration of these activities and is responsible for ensuring that all the elements of the planning are coordinated and consistent. The State is also responsible for ensuring that public participation, intergovernmental input in the form of advisory group activities, and other coordination functions are carried out in each planning area. Because these coordination activities should be closely related to the planning tasks, if the State has delegated the major planning tasks to another agency, the State may also choose to delegate its supervisory and coordination functions as a lead agency in the approved planning area. This lead agency would then be responsible to carry out the public participation program, the coordination with advisory groups and interagency coordination activities. The lead agency in the approved planning area could also undertake the day to day supervision of the work plan for the area and the updating of the work plan. It must be emphasized, nevertheless, that any delegation of the State's functions in planning, including supervisory and coordination functions, does not modify the responsibility of the State to ensure that the requirements of the Act are carried out.

As indicated below, work plans should be drawn up for each approved planning area. Within each planning area all the tasks needed for completing the State WQM Plan should be assigned to a specific agency, and the subarea in which the tasks are to be carried out should be delineated. The lead agency in the approved planning area having supervisory and coordination responsibilities should also be designated. The lead agency should be assigned the tasks of public participation, coordination with advisory groups of local officials and interagency coordination.

- Consultation with Locally Elected Officials and Local Organizations (§130.14(b))

The State should develop appropriate mechanisms for consulting with locally elected officials and local organizations for purposes of determining planning responsibilities. The public participation and intergovernmental cooperation procedures developed in the continuing planning process (see Ch. 2.3.B) should be used for consultation concerning delegation of planning responsibilities.

. Description of Delegated Planning Agency(s) (§130.14(c),(d))

In describing planning agencies which have been delegated to undertake State WQM planning responsibilities, the agency's name, address, name of director, planning responsibilities and geographic coverage, and other pertinent information should be included as part of the information furnished in the State/EPA Agreement. In addition, the agency designated to undertake State WQM Plan responsibilities should furnish information demonstrating its interest and capability to undertake the planning responsibilities. This information could consist of:

- citation of the agency's planning authority
- information on the agency's experience in related planning
- intergovernmental agreements to undertake planning
- policy statements or resolutions of affected governments
- information on the availability of budget and staff to undertake planning
- any other information that the State might regard as necessary to indicate willingness to undertake planning

. Nonpoint Source Planning Responsibilities

In the State/EPA Agreement that is initially submitted, the State should explicitly make its intentions known regarding nonpoint source planning and regulatory responsibilities in areas where 208 planning agencies have been designated or where the State intends to designate such areas. If the State intends to undertake nonpoint source planning and regulatory activities in areas already designated for 208 planning it should notify the responsible agencies in writing and also so notify the EPA Regional Administrator. The State should request the EPA Regional Administrator to appropriately modify the areawide planning project work plan. The State should indicate its concurrence with any areawide planning project work plans when it develops the State/EPA Agreement.

. Additional Delegation to Planning Agencies (§130.14(e))

Additional planning agency delegations may be made through the continuing planning process revision procedure.

## 4. State/EPA Agreement for each Approved Planning Area (§130.11(a))

The State/EPA agreement on level of detail and timing of State WQM Plan preparation is, in effect, a work program for the State WQM planning effort. An agreement should be drawn up for each approved planning area*, indicating the following information:

- boundary of planning area and subareas where specific forms of planning may be needed. (same as chosen pursuant to §130.10(c)(2))
- level of detail of plan elements or outputs
- planning tasks to be accomplished to produce the elements of a State WQM Plan
- logical relationships and interdependencies between tasks
- planning agency responsible and timing of each task
- lead planning agency responsible for coordinating planning within the planning area.

The level of detail of planning will depend on the types of problems encountered in the planning area and priorities for resolving these problems. Further guidance on determining level of detail of the elements of a State WQM Plan is contained in Ch. 3.

### . Certification that no Water Quality or Source Control Problem Exists (§130.11(b))

As indicated above, the entire State should be divided into planning areas within which subareas having particular problems may be delineated for particular forms of planning. In the event that a particular water quality parameter for which a numerical standard exists is not being exceeded, or that particular types of pollution sources or activities do not exist (and will not exist over the 20 year planning period), the State may certify that planning for these water quality problems and/or sources is not necessary. These certifications must be made for each planning area where the water quality problems do not exist and must indicate:

---

* Proposed or approved work plans in designated planning areas may be used to satisfy the requirement for a State/EPA Agreement if the State so chooses.

- the water quality parameter(s) not being exceeded

- activities or sources of pollution which do not require planning consideration

- geographic extent (if appropriate) of areas where problems do not exist, related to approved planning areas

- documentation supporting the certification (for example: water quality data, population and employment projections, hydrologic or geologic information)

The certifications should be submitted as part of the State/EPA Agreement, which is to be submitted 150 days after the effective date of the Part 130 regulation.

. Phasing of Planning (§130.11(c))

The Agreement must provide a sequence for phasing of §131 plan preparation for completion by November 1, 1978 at the appropriate level of detail and in sufficient time to meet the 1983 national water quality goal specified in Section 101(a)(2) of the Act. The level of detail of each plan element should be such that upon completion of the element implementation of needed control measures can proceed expeditiously. However, as indicated in the guidance on State WQM Plan development (Ch. 3.3) in some cases, where uncertainty exists regarding the existence of a past water quality problem or where implementation cannot be undertaken within the next five years, the level of detail of plan elements may consist of an assessment of control needs.

The following important dates should be kept in mind:

- November 28, 1975 -- final Parts 130, 131 promulgation
- January 27, 1976 -- Identification of areas eligible for designation under Section 208(a)(2)-(4)
- April 26, 1976 -- Continuing planning process revisions to be submitted by State to Regional Administrator
- April 26, 1976 -- Complete documentation of areawide planning area designations to be submitted to Regional Administrator
- May 26, 1976 -- Regional Administrator to approve/conditionally approve/disapprove continuing planning process
- July 1, 1976 -- Phase I Water Quality Management Plans due where extensions have been granted

- September 1976 & September 1978 -- Biennial Report to Congress on Municipal Needs
- July 1977 -- Recommended revisions of water quality standards due
- December 1977 -- Second round of NPDES permits
- November 1, 1978 -- State WQM Plans due for final submission to Regional Administrator
- March 1, 1979 -- Regional Administrator to approve/conditionally approve/disapprove State WQM Plan and Implementation Program

Within a given planning area the State/EPA Agreement should provide appropriate timing of the various elements of a State WQM Plan. As the above schedule indicates, the planning period for preparation of the State WQM Plan is somewhat more than 2 years (between finalizing the State/EPA Agreement and submission of plans).

## E. Review/Revision of Water Quality Standards and Definition of Antidegradation Policy

EPA policy on the review and revision of water quality standards is stated in §130.17. Detailed guidance interpreting how to meet the requirements of §130.17 is contained in Ch. 5. The following is an overview of the steps that the State would need to follow to carry out the policy expressed in §130.17:

### 1. Develop Standards Revision Policy §130.10(b)(1), (2)

Recommendation for revision of standards are needed for two general situations: first, to adequately protect existing instream beneficial uses (including high quality waters for which existing standards are not stringent enough) and second, to propose upgrading of existing designated use classifications in order to achieve the 1983 goals.

In either of these situations, the recommended standards should include the following basic characteristics:

- Appropriate beneficial uses should be indicated and categorized

Beneficial uses would include public water supply, propagation of fish, shellfish and wildlife, recreation, agricultural water supply, industrial water supply, and other uses of water including navigation. The currently designated uses must be maintained with limited exceptions. The existing water quality supporting these beneficial uses would have to be maintained, protected, or improved. These uses should be consistent with the general welfare and must provide for protection of public health. Thus water uses that only benfit particular users should not be chosen unless these uses do not preclude uses sought by the general public.

- Adequate criteria to support the uses should be included

Both narrative and numerical criteria should be specified at a level needed to protect the beneficial uses. The criteria should cover those pollutant substances that represent serious existing or potential problems in a water body and that would require limitation in order to protect beneficial uses. The values chosen for numerical criteria should be consistent with those recommended in the EPA Document Quality Criteria for Water, to be published pursuant to Section 304(a) of the Act.

- Anti-degradation Policy should be established and Implemented

The State should determine how existing high quality waters will be protected through implementation of appropriate point and nonpoint source controls to be specified in the State WQM Plan. If the State chooses to allow some deterioration of existing water quality (where existing waters are at a level above that necessary to provide minimum protection of beneficial uses), it must meet the procedural requirements indicated in Part §130.17(e) as well as the substantive requirements of other Federal law protecting existing water uses on Federal lands* The specific beneficial uses and necessary criteria to protect these beneficial uses should be indicated for waters to be covered by the State's anti-degradation policy and implementation program.

---

* Other Federal laws that may protect existing instream water quality include, but are not limited to:
(i) The Endangered Species Act
(ii) The Marine Mammal Act
(iii) The Wilderness Act
(iv) The Coastal Zone Management Act
(v) The Safe Drinking Water Act
(vi) The National Historic Preservation Act
(vii) The Wild and Scenic Rivers Act
(viii) The organic acts and executive orders creating Federal land managing agencies.

- Other technical and procedural requirements

In addition to the basic characteristic described above, the recommendation for standards revision should conform with the detailed technical and procedural guidance on standards revision contained in Chapter 5.

### 2. Determine Relationship Between Standards Revision Process and State WQM Plan Development

In order to carry out water quality analysis and develop implementation measures, it is necessary to have a clear set of planning objectives. The State water quality standards as revised (or proposed) consistent with §130.17 will provide the primary set of planning goals. In revising standards it is also important to understand the implications of a particular policy in terms of the implementing actions required. Because standards revision and plan development are two interdependent processes that should be carried out in the same time frame, it is necessary to make some simplifying assumptions in order to initiate each process without depending entirely on the results of the other process. Once standards policies have been proposed and implementing actions for these general policies evaluated, it is possible to further refine both the standards policies and implementing actions.

The planning process can make recommendations for revisions to State water quality standards where necessary. The States are not required to adopt these recommendations. If they are rejected, the plan must then be modified to be consistent with the established State water quality standards. Table 2.2 outlines the general procedures for carrying out both the standards revision and plan development process.

### 3. Determine Schedule for Standards Revision (§130.10(c)(5))

The continuing planning process submission should include a schedule for carrying out the standards revision process described above. The schedule should indicate the following milestones:

- Timing for State transmittal of recommended standards revision policy consistent with §130.17 to planning agency(s) developing State WQM Plan

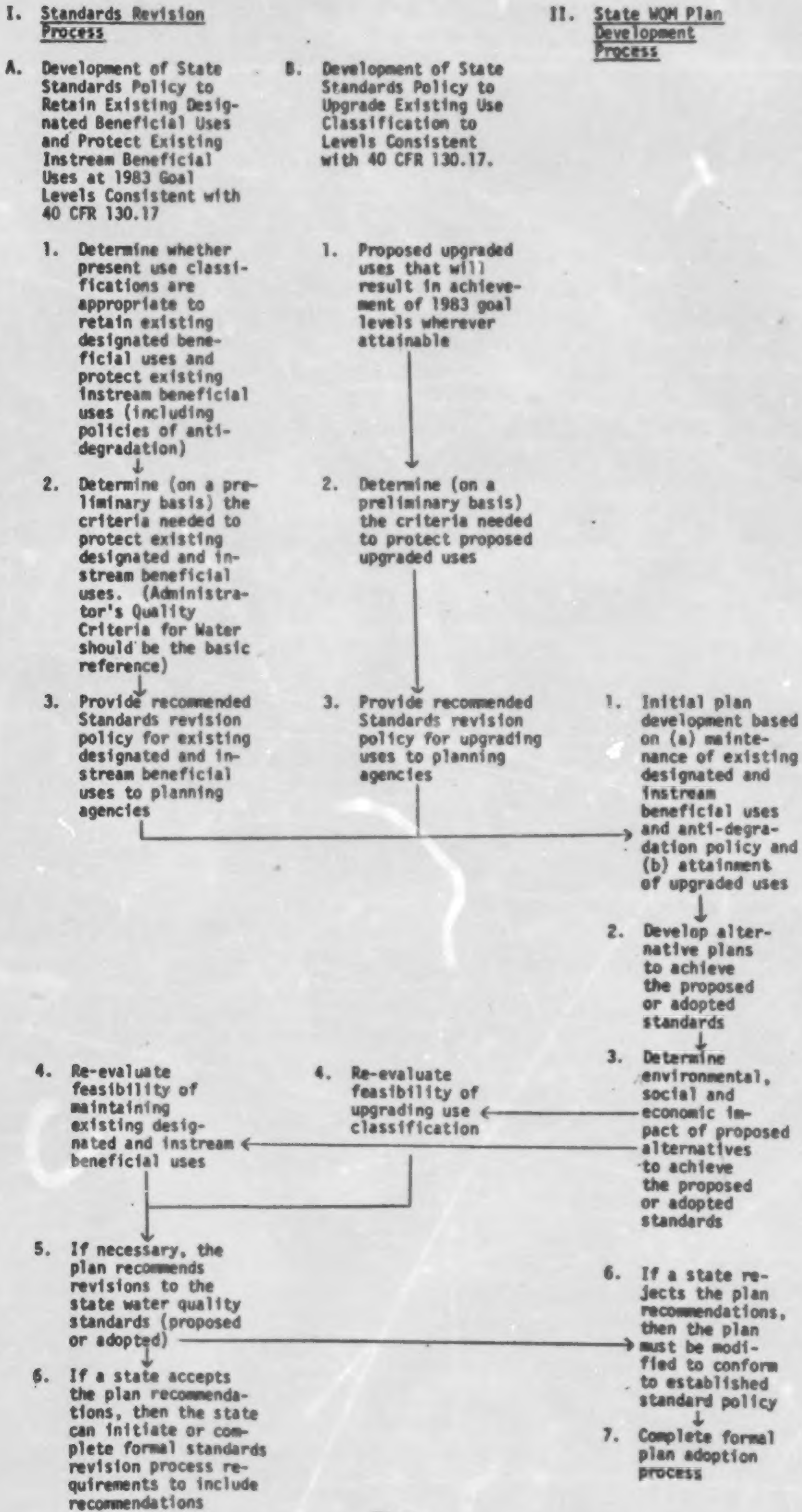
- Timing of planning agency(s) evaluation of proposed or adopted standards revision

- Timing of public hearings on proposed or adopted standards revision

- Timing for State formal adoption revisions to proposed standards recommended by the planning process.

In general the State should attempt to develop a standards revision policy consistent with §130.17 as soon as possible, in order to provide planning objectives to agency(s) developing the State WQM Plan. Sufficient time should be alloted for the State to conduct the procedures required under State law for standards revision. Adopted revisions of standards must be submitted to the EPA Regional Administrator by July 1, 1977.

Table 2.2. Relationship of Water Quality Standards and Water Quality Management Plans



## I. Standards Revision Process

**A.** Development of State Standards Policy to Retain Existing Designated Beneficial Uses and Protect Existing Instream Beneficial Uses at 1983 Goal Levels Consistent with 40 CFR 130.17

1. Determine whether present use classifications are appropriate to retain existing designated beneficial uses and protect existing instream beneficial uses (including policies of antidegradation)
2. Determine (on a preliminary basis) the criteria needed to protect existing designated and instream beneficial uses. (Administrator's Quality Criteria for Water should be the basic reference)
3. Provide recommended Standards revision policy for existing designated and instream beneficial uses to planning agencies
4. Re-evaluate feasibility of maintaining existing designated and instream beneficial uses
5. If necessary, the plan recommends revisions to the state water quality standards (proposed or adopted)
6. If a state accepts the plan recommendations, then the state can initiate or complete formal standards revision process requirements to include recommendations

**B.** Development of State Standards Policy to Upgrade Existing Use Classification to Levels Consistent with 40 CFR 130.17.

1. Proposed upgraded uses that will result in achievement of 1983 goal levels wherever attainable
2. Determine (on a preliminary basis) the criteria needed to protect proposed upgraded uses
3. Provide recommended Standards revision policy for upgrading uses to planning agencies
4. Re-evaluate feasibility of upgrading use classification

## II. State WQM Plan Development Process

1. Initial plan development based on (a) maintenance of existing designated and instream beneficial uses and anti-degradation policy and (b) attainment of upgraded uses
2. Develop alternative plans to achieve the proposed or adopted standards
3. Determine environmental, social and economic impact of proposed alternatives to achieve the proposed or adopted standards
6. If a state rejects the plan recommendations, then the plan must be modified to conform to established standard policy
7. Complete formal plan adoption process

## F. Preparation of State Water Quality Management Programs

The continuing planning process stages described above are primarily organizational and management stages. The State WQM Plans on the other hand is the vehicle for determining the actions to be taken to meet water quality goals.

### 1. Requirements for Preparation of State WQM Plans (§130.10(a)(4), (5))

The continuing planning process submission should indicate how the State intends to complete the requirements for State WQM Plans, including standards revision and antidegradation policy. The State/EPA Agreement should serve as the basis for indicating the State's approach for meeting the State WQM Plans requirements. Guidance on meeting these requirements is presented in the chapters that follow.

### 2. Review and Certification of Plans for Areawide Planning Areas

Procedures for review and certification of areawide plans pursuant to §131.20(f) is discussed in Ch. 3.10.

### 3. Designation of Management Agencies (§130.15)

#### . Timing of Designations (§130.15(a))

The requirement that the continuing planning process identify management agencies (§130.15) should be fulfilled when specific elements of the State WQM Plan have been developed and proposed for implementation. Agencies to implement elements of the State WQM Plan should be indicated in completing elements (n) and (o) of 40 CFR Part 131.11.

#### . Designation Prior to State WQM Plan Completion (§130.15(c))

The timing requirements for various elements of the State WQM Plan have been discussed in Ch. 2.3.D. Management agencies should be designated for each part of the State WQM Plan which can be implemented as a discrete plan element. The designation should be timed to coincide with the completion of the corresponding element.

A detailed discussion of the legal authority, financial capability, and managerial and institutional capabilities of operating and implementing agencies is discussed in Chapters 9-11.

Procedures for designating implementing and operating agencies are discussed in Ch. 3.10 as part of the procedures for review/approval of State WQM Plans.

## G. Outputs: Description of State Continuing Planning Process §130.10(a)-(c)

After each of the major steps in developing the continuing planning process have been completed, a description of the overall process should be prepared. The description should cover each of the process elements required under §130.10(a)-(c).

### 1. Optimal Format for Continuing Planning Process Submission

For purposes of simplifying the description of these process elements, the continuing planning process submission might, where appropriate, describe the following characteristics of the process elements:

- Purpose -- purpose of element, including description of how the element meets statutory requirements
- procedures -- procedures that the State will use to carry out each element in the Continuing Planning Process (including revision of the element)
- inputs/outputs -- inputs to the elements, outputs, and relationships of inputs and outputs to other elements
- timing -- timing of the element
- supporting documents -- any specific supporting information required in Part 130

For example, taking the general requirement of the process description which calls for a description of public participation in the Continuing Planning Process (§130.10(a)(1)), the State might answer the following questions in developing this part of its process description:

- purpose -- What is the purpose of public participation at various stages of the process?
- procedures -- How is an effective program of public participation structured with respect to the various stages of planning? What forms or techniques of public participation are used? What institutional arrangements are used?

- inputs/outputs -- In what manner is information gathered through public participation used as an input to decision making? How is the public kept aware of the results or outputs of decisions in the process:

- timing -- When do the various public participation activities occur? How much time is given to the public to respond to decisions made in the process?

- supporting documents -- Any additional documents needed to describe the State's program for public participation.

A completed continuing planning process description could thus be organized around the characteristics of each element of the process suggested by this format. A summary of the process description could be displayed in a table such as the following (see Table 2.3). The States should be encouraged to develop whatever outline for describing their planning process that seems most appropriate. The significance of the format suggested above and the format for a summary of the process description is that the State should attempt to develop a very simple reference document which would serve as an index for anyone interested in the State's water program to understand the way in which the program was managed, its program elements, their relationships, timing, and interaction with other activities.

## H. Planning Process Adoption and Approval Procedures

### 1. Planning Process Adoption (§130.40(a))

All States will be required to revise parts of their continuing planning process in order to incorporate substantive changes in the processes such as the State/EPA Agreement on carrying out State WQM Plans. All States will also need to reformulate their continuing planning process in order to comply with the revised requirements of 40 CFR Part 130. Submission of the Continuing Planning Process description or elements of the process requiring revision is required 150 days after the effective date of 40 CFR Parts 130/131 regulations. In order to meet this time schedule, the planning process description should be formally adopted by the State after appropriate public participation before the 150 day period expires.

Formal adoption of the process entails certification by the State agency having authority over water quality planning and implementation, that the process will be followed as the management and decision making framework for all activities of that agency.

## Table 2.3 Optional Format for Summary of Description of State Continuing Planning Process

| Elements of Process | Requirements of Part 130 | Description of Element | | | | |
|---|---|---|---|---|---|---|
| | | Purpose | Procedures | Timing | Inputs/ Outputs | Supporting Documents |
| A. Process Design | | | | | | |
| 1. State Agency Responsible for Coordinating Continuing Planning Process and State WQM Plans | §130.10 (c)(6) | | | | | |
| 2. Statement of Planning Authority | (c)(11) | | | | | |
| 3. Preliminary Description of Process Requirements | - | | | | | |
| 4. Review and Revision Procedures | §130.43 | | | | | |
| B. Process Inputs | §130.10 | | | | | |
| 1. Public Participation | (a)(1) | | | | | |
| 2. Intergovernmental Cooperation and Coordination | (a)(2),(c)(10) | | | | | |
| 3. Program Coordination<br>a. Water Program Relationships<br>b. Coordination with other Local, State, and Federal Programs | (a)(3),(c)(8) | | | | | |
| C. Preparation of Annual State Strategy | §130.10 (b)(4) | | | | | |
| D. State/EPA Agreement (including Delineation of Planning Areas and Planning Responsibilities) | | | | | | |
| 1. Segment Classification; Listing of Basins or Approved Planning Areas and Segments | §130.10 (c)(2) (c)(3) (c)(7) | | | | | |
| 2. Designation of Areawide Planning Areas and Agencies | (c)(7) | | | | | |
| 3. Delegation of Planning Responsibilities | (c)(9) | | | | | |
| 4. Annual Preparation/Revision of Agreement | (c)(4) | | | | | |
| E. Review/Revision of Water Quality Standards and Definition of Antidegradation Policy | §130.10 (b)(1) (b)(2) (c)(5) | | | | | |
| F. Preparation of State Water Quality Management Plans | | | | | | |
| 1. Requirements for State WQM Preparation | §130.10 (a)(4) (a)(5) | | | | | |
| 2. Review and Certification of Plans for Areawide Planning Areas | (b)(3) | | | | | |
| 3. Designation of Management Agencies to Implement Plans | §130.15 | | | | | |
| G. Outputs: Description of State Continuing Planning Process | (see above) | | | | | |
| H. Planning Process Adoption and Approval Procedures | | | | | | |
| 1. Planning Process Adoption | §130.40 | | | | | |
| 2. Submission | §130.40 | | | | | |
| 3. Review and Approval | §130.41-42 | | | | | |

### 2. Submission (§130.40(b), (c))

After the State water quality agency has adopted the description of the planning process, the Governor or his designee is required to submit the adopted process to the Regional Administrator within 150 days after the effective date of 40 CFR Parts 130/131 revised regulations.

The Governor or his designee is required to notify the Regional Administrator by letter of the process submission and furnish a description of the process itself. This guideline has been developed to facilitate preparation of the process description. The description could follow the format suggested in Table 2.3 or any other format suitable for describing the continuing planning process.

### 3. Review and Approval (§130.41)

The Regional Administrator is required to approve, conditionally approve, or disapprove the planning process within 30 days of its submission by the Governor.

- Full Approval

  The Regional Administrator is required to approve a planning process description (and so notify the Governor by letter) if the process meets the requirements of the Act and 40 CFR Part 130 revised.

- Conditional Approval or Disapproval

  In the event that the Regional Administrator finds that the process is deficient in providing the elements required in a continuing planning process, he may specify in a letter to the Governor particular deficiencies and a schedule for resubmitting the elements of the process found deficient.

  The Regional Administrator may disapprove the entire process if it is found grossly deficient and does not reasonably demonstrate a coherent management approach to completing the substantive elements of a State WQM Plan by the statutory deadline. If the process is disapproved, specific deficiencies and a schedule for resubmission should be set out in the letter of notification to the Governor.

- Withdrawal of Approval (§130.42)

  Any plans developed under the process that do not meet the requirements of 40 CFR Part 131 should be viewed by the Regional

Administrator as indication of a possible deficiency in the management approach (e.g., the continuing planning process) used by the State to develop State WQM Plans.

If the Regional Administrator finds deficiencies in State WQM Plans or portions of the plans, he should initiate an inquiry into the cause of the deficiency and ascertain which elements of the continuing planning process were not carried out as planned, and what changes might be needed to make the process operate more efficiently.

After conducting an investigation of the causes of State WQM Plan deficiency and the relationship of such deficiencies to the State's continuing planning process, the Regional Administrator may disapprove the continuing planning process by formally notifying the Governor of the affected State, and indicating the specific remedy for correcting the inadequacy of the process and a schedule for corrective action.

4. Review and Revision (§130.43)

The State's procedure for review and revision of its continuing planning process should be specified in its continuing planning process description as suggested in Ch. 2.3.A.

# CHAPTER 3

## State Water Quality

## Management Plan Development

### 3.1 Scope and Purpose

State and areawide WQM Plans are required in all areas of each State. The purpose of these plans is to develop a management program to implement requirements for water quality standards establishment and revision (§303(c)), identification of areas where effluent limitations are not sufficient to meet standards and establishment of total maximum daily loads of pollutants ((§303(d)), implementation of water quality standards (§303(e)), and to carry out the planning and management requirements of §208 statewide.

### 3.2 Program Objectives

#### A. Principal Objective

The overall objective of the Act is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters" (Section 101(a)). To achieve this objective, "it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983" (Section 101(a)(2)). To enable meeting the Act's objectives, "it is the national policy that areawide waste treatment management planning processes be developed and implemented to assure adequate control of sources of pollutants in each State" (Section 101(a)(5)).

Thus the objective of the State WQM Plan is to define water quality standards to implement the goals of the Act, determine allowable standards pursuant to Section 303, to develop plans for pollution abatement as required in Section 208(b)(2), and finally to select management agency(s) to implement the plan as specified in Section 208(c)(2).

#### B. Complementary Objectives

To complement the water quality goals of Section 101(a)(2), provisions of Title II of the Act provide for additional aspects of water quality protection such as:

- Water conservation and resource utilization through wastewater reuse or recycling;

- Management of residual waste;

- Multiple use of wastewater treatment systems and associated lands for such purposes as water supply, recreation, aesthetics, and fish and wildlife habitats;

- Protection of ground water quality.

Any other water-related goals of the planning area, such as provision of adequate water supply and programs for land or water resource management should be identified for consideration in development of the plans. These related goals should be recognized in the planning process and should be incorporated into the plan to the extent that their achievement would not reduce the cost-effectiveness of the water quality management measures.

Finally, the results of the planning process should be coordinated with other plans for the area, such as those discussed in Ch. 2.

## 3.3 Program Content

### A. Major Program Components and Requirement Elements

The required elements of State WQM Plans provide the basis for a continuing planning and management program for water pollution abatement. These elements form two major components for a water quality planning and management program: analysis and action. The analytic component of the program incorporates the following elements:

- Water Quality Analysis Program
  - Planning Boundaries;
  - Water Quality Assessments (including nonpoint source assessment) and Segment Classifications;
  - Inventories and Projections of Discharges;
  - Revision of Standards;
  - Total Maximum Daily Loads;
  - Wasteload Allocations.

The implementation component of the program includes the following elements:

- Water Quality Implementation Program
  - Municipal and Industrial Treatment Works Program;
  - Urban Stormwater Management Program;
  - Residual Waste Management Program;
  - Nonpoint Source Management Program;
  - Target Abatement Dates and Schedules of Compliance;
  - Regulatory Program;
  - Management Program -- Management Agency(s) and Institutional Arrangements to Supervise and Finance Plan Implementation.

In addition to these program components, the State WQM Plan is required to include an environmental assessment, covering both the analytic and implementation aspects of the plan.

## B. Planning Responsibilities

The State is responsible for developing the total State WQM Plan. The State may, however, designate 208 planning agencies to carry out some or all of the Water Quality Implementation Program elements and provide much of the analysis needed by the State to finalize the Water Quality Analysis Program. In areas which are not designated for 208 planning, the entire State WQM Plan for that area is to be completed by the State. Nevertheless, the State may delegate (if these agencies agree) portions of the planning to substate or Federal agencies. In the State/EPA Agreement for each area, the State must identify the agency responsible for each of these planning elements.

## C. Level of Detail of Plan Elements

The regulation is very specific in describing many of the plan elements. In other cases, the regulation has been written to provide latitude for interpreting these elements. To provide a common interpretation for these elements, criteria should be applied to determine that the requirements are met. A summary of the criteria for meeting the requirements of the regulation is found in Table 3.1 (p. 3 - 56 ff). These criteria provide "tests" regarding the level of detail, factors to be considered, and overall justification used in meeting each requirement of the regulation. The "tests" should not be viewed as a substitute for the requirements of the regulation itself, but as a means for interpreting how to meet the requirements.

In general, the criteria for meeting the requirements of the regulation indicate that each element of the plan be developed in sufficient detail to enable implementation of that element. However, there may a valid reason for not proceeding immediately to develop a particular element of the plan at the level of detail indicated in Table 3.1. Where it is not clearly understood that a particular water quality problem exists, or where it is not expected that a control project can be undertaken to correct a problem in the next five years, the Water Quality Implementation Program -- elements (h) - (o) (see Table 3.1) of the plan can be developed in less detail than stated in Table 3.1. In all cases, the Water Quality Analysis Program -- elements (a) - (g) should be developed at the level of detail indicated in Table 3.1, since these elements provide the basis for developing the implementation measures. The level of detail of the environmental assessment will naturally be dependent on the level of detail of the implementation program.

In cases in which elements (h) - (o) are not developed at the level of detail indicated in Table 3.1, an assessment of possible control measures, regulatory programs, and financial and management arrangements corresponding to that element should be undertaken. The decision on where the required elements can be completed at the level of detail suggested in Table 3.1 must be included in the State/EPA Agreement. Table 3.2 indicates the level of detail to which elements (h) - (o) should be developed where an assessment is sufficient.

## D. Planning Methods

Because water quality problems and priorities in managing these problems will vary in different areas of the State, the elements of the State WQM Plan that deal with abatement of different sources of pollution ((h) - (m) in Table 3.1) may be developed through different methods of analysis depending on the magnitude of the problem. Depending on the method of analysis used to develop these elements, greater or lesser complexity will arise in assessing how to implement the abatement measures (elements (n) - (o) and selecting among alternatives (element (p)).

In complex urban-industrial areas, the requirements of Section 208 and 303 should be developed through a planning process that considers the interaction of all sources of pollution and management approaches for abatement of these sources. The EPA Guidelines for Areawide Waste Treatment Management (August 1975) should be followed in areas where 208 planning has already been initiated pursuant to 40 CFR Part 35 Interim Grant Regulations.

The guidance presented in this document recommends alternative planning methods depending on the nature of pollution problems. For complex problem areas these guidelines recommend a planning approach which is conceptually the same as that recommended in the Guidelines for Areawide Waste Treatment Management Planning.

## TABLE 3.2

## Assessment for

## Water Quality Implementation Program

| Category of Plan Elements* | Level of Detail of Assessment |
|---|---|
| • abatement measure elements (e.g., element (h), (i), (j), (k), (l), (m)) | • description of existing abatement measures and their adequacy and effectiveness<br>• procedure to develop specifications for needed abatement measures, and proposed date of development of such specifications and abatement measures |
| • regulatory programs elements (e.g., element (n)) | • description and evaluation of existing regulatory programs and an indication of whether authority exists to implement needed abatement measures<br>• procedures and timing for developing needed regulatory programs |
| • management agency and financial arrangement elements (e.g., element (o)) | • indication of agency(s) having jurisdiction to deal with problem<br>• generalized cost estimate for correcting problem<br>• procedure and timing for identifying needed management agency(s) and financial arrangement to implement abatement measures |

---

*These elements are found in Table 3.1 The elements can be conveniently arranged into the categories shown above, each of which would be needed in developing an effective implementation program for any form of pollution. No distinction in level of detail of the analytic requirements (Elements (a) - (g) in Table 3.1) should be made.

### 3.4 Planning Criteria

The State WQM Plans will be evaluated by States and EPA in terms of their ability to achieve the planning objectives in a given area. The Act also provides certain criteria for choosing among the means for achieving these objectives.

The following criteria should be used in the planning process, in plan selection, and will be applied by the States and EPA in plan review and approval:

#### A. Cost-Effectiveness

The Federal Water Pollution Control Act specifies cost-effectiveness as the criteria for the planning and development of wastewater management programs, in particular as those programs relate to municipal treatment works and controls of combined sewer overflows and storm sewer discharges.

EPA has defined cost-effectiveness analysis as a systematic comparison of alternatives to identify the solution which minimizes total costs to society over time to reliably meet given goals and objectives. Since Section 208(b)(2)(e) specifies that the plan should document the economic, social, and environmental impact of plan implementation, the local economic impact (in addition to resource costs) must be included in the total costs to society. Thus the total costs to society to be minimized should include:

- resource costs;
- economic costs;
- social costs;
- environmental costs;

In the case of State WQM Plans, effectiveness refers to meeting the 1983 goals of the Act while providing for the highest practical degree of technical reliability in the pollution control alternative that is chosen.

#### B. Implementation Feasibility

Explicit criteria for determining adequacy of the management provisions for carrying out waste treatment management are not provided in the Act. This guideline sets forth the following criteria, further elaborated in Ch. 9, for evaluating implementation feasibility of the management provisions of a plan:

- adequate legal authority;
- adequate financial capacity;
- practicability;
- managerial capacity;
- public accountability.

### C. Public Acceptance

Since the success of a State WQM Plan depends on its acceptance by affected units of government, the acceptability of the plan to the general public and elected officials in a planning area should also be regarded as a basic planning criterion. The application of this criterion in the planning process is further discussed in Ch. 4.

## 3.5 Planning Sequence

### A. Purpose

The purpose of the planning process is to systematically evaluate alternative means of achieving water quality goals and to formulate a plan that can be implemented by a management agency. The planning process should integrate technical needs for pollution abatement and management arrangements capable of implementing the abatement measures, and provide for public participation in plan development.

In order to develop each of the components of a State WQM Plan -- (1) Water Quality Analysis Program, and(2) Water Quality Implementation Program -- two forms of planning are necessary: technical analysis and management/institutional analysis. The planning process can thus be divided into technical and management planning, each of which is concerned with analysis and action, but which normally rely on different sets of planning expertise.

The technical planning portion of the planning process involves identifying the priority water quality problems of the area, recognizing any constraints in dealing with the problems, and developing alternatives to achieve water quality goals. The alternative plans may then be evaluated according to the planning criteria discussed in this chapter.

Management planning, which concerns selection of a management agency or agencies and development of appropriate institutional arrangements for plan implementation, should be conducted concurrently and in *coordination with technical* planning. Management planning should identify water quality management problems, and analyze the capability of existing agencies and arrangements to carry out the regulatory and management requirements of Section 208. Institutional problems, lack of authority, or lack of financial capacity for meeting Section 208 requirements should be identified. Alternative means to acquire proper authority, financial capacity, and effective institutional arrangements for plan implementation should be developed. Finally, alternative management agency(s) and institutional arrangements should be evaluated and a single alternative selected according to criteria discussed in this chapter.

Developing alternative technical and management plans and selection of a State WQM Plan require public participation throughout the planning process. Public participation requirements and means for ensuring adequate participation at each stage in the planning process are discussed in Ch. 4.

### B. Planning Flow Chart

Table 3.3 is a flow chart depicting a series of steps to develop a State WQM Plan. Some of the steps are needed to complete required plan elements* and are so denoted in the text accompanying the chart. The chart also includes many optional planning steps which may prove helpful in developing a coherent plan to meet the requirements.

Table 3.1 includes criteria or "tests" for determining the factors and information to be considered and overall justification used in meeting each requirement of the regulation. The guidance presented in this chapter on each plan element is related to the criteria found in Table 3.1. Both the criteria and guidance sections follow the outline of the regulation except where noted otherwise.

## 3.6 Technical Planning

### A. Purpose

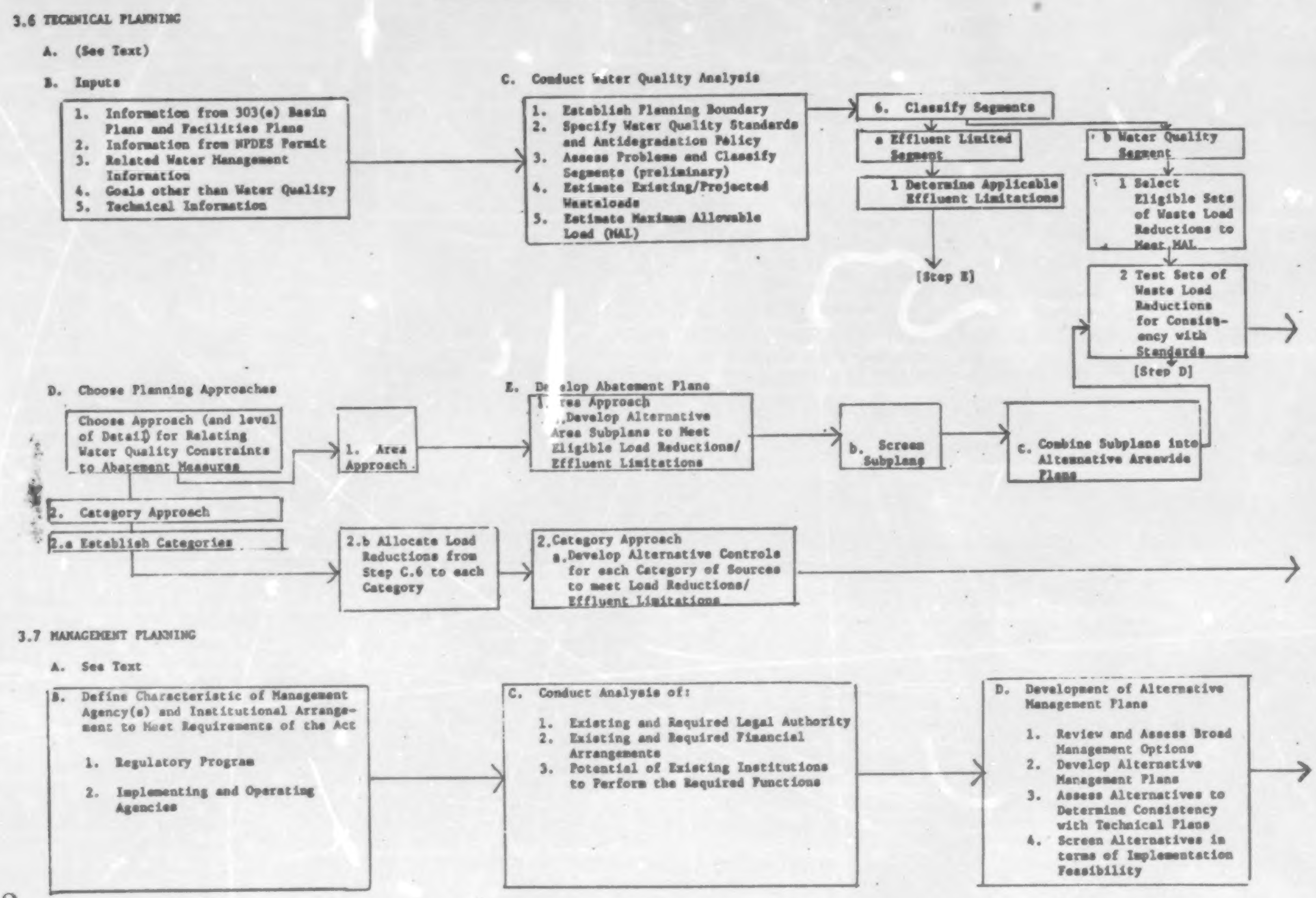
The purpose of technical planning is to develop a coordinated water quality management strategy to meet 1983 water quality goals. The strategy may be a combination of: (1) municipal wastewater treatment systems, (2) industrial wastewater pretreatment or treatment, (3) residual waste management, (4) urban stormwater management, and (5) nonpoint source management. Implementation

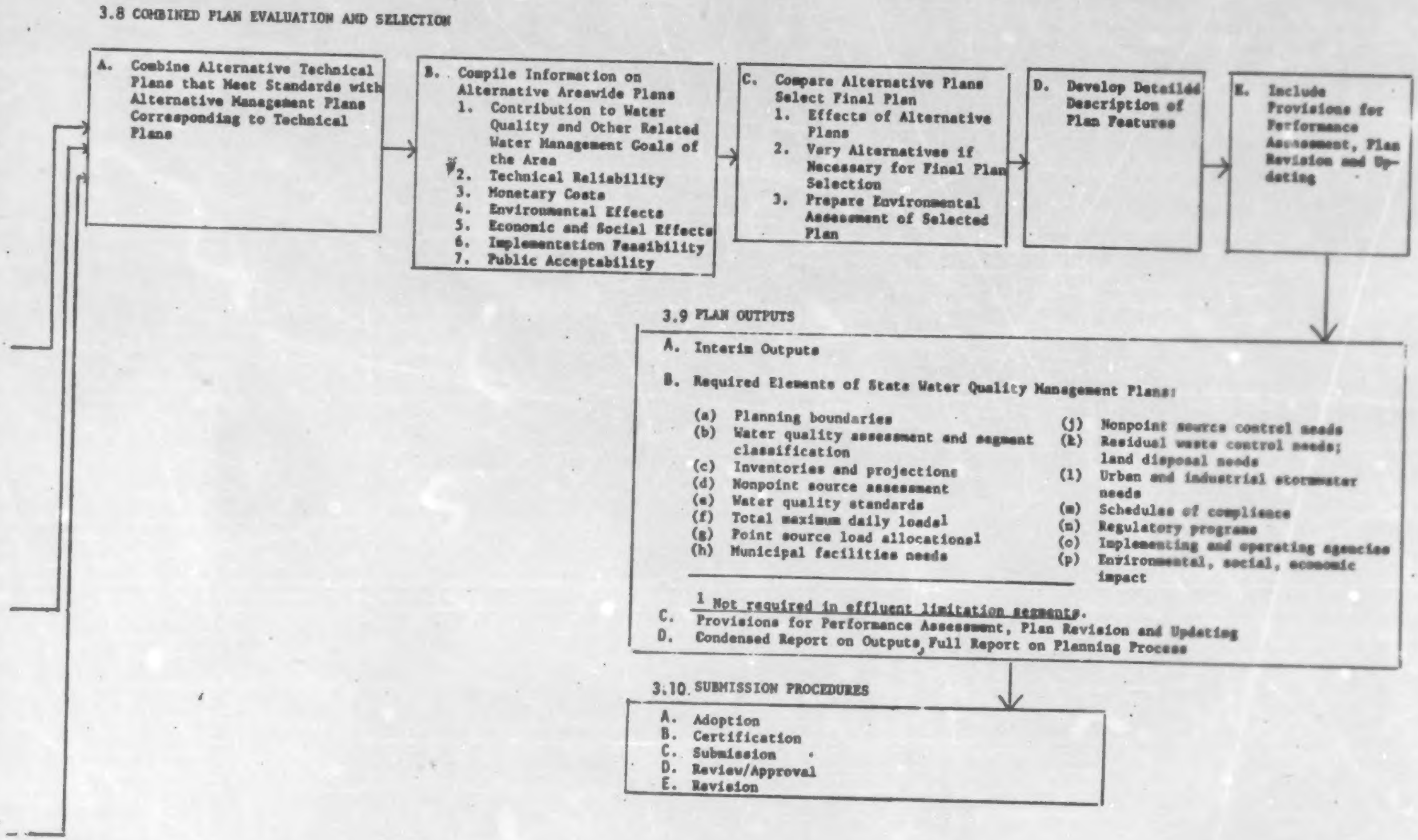
---

*Denoted in the accompanying text as Element (a), (b), (c), etc., corresponding to 40 CFR Part 131.11 (a) - (o).

TABLE 3.3

Flow Chart - State Water Quality Management Planning Process


3.6 TECHNICAL PLANNING
A. (See Text)
B. Inputs
1. Information from 303(e) Basin Plans and Facilities Plans
2. Information from NPDES Permit
3. Related Water Management Information
4. Goals other than Water Quality
5. Technical Information
C. Conduct Water Quality Analysis
1. Establish Planning Boundary
2. Specify Water Quality Standards and Antidegradation Policy
3. Assess Problems and Classify Segments (preliminary)
4. Estimate Existing/Projected Wasteloads
5. Estimate Maximum Allowable Load (MAL)
6. Classify Segments
a Effluent Limited Segment
1 Determine Applicable Effluent Limitations
[Step E]
b Water Quality Segment
1 Select Eligible Sets of Waste Load Reductions to Meet MAL
2 Test Sets of Waste Load Reductions for Consistency with Standards
[Step D]
D. Choose Planning Approaches
Choose Approach (and level of Detail) for Relating Water Quality Constraints to Abatement Measures
1. Area Approach
2. Category Approach
2.a Establish Categories
2.b Allocate Load Reductions from Step C.6 to each Category
E. Develop Abatement Plans
1. Area Approach
a. Develop Alternative Area Subplans to Meet Eligible Load Reductions/Effluent Limitations
b. Screen Subplans
c. Combine Subplans into Alternative Areawide Plans
2. Category Approach
a. Develop Alternative Controls for each Category of Sources to meet Load Reductions/Effluent Limitations
3.7 MANAGEMENT PLANNING
A. See Text
B. Define Characteristic of Management Agency(s) and Institutional Arrangement to Meet Requirements of the Act
1. Regulatory Program
2. Implementing and Operating Agencies
C. Conduct Analysis of:
1. Existing and Required Legal Authority
2. Existing and Required Financial Arrangements
3. Potential of Existing Institutions to Perform the Required Functions
D. Development of Alternative Management Plans
1. Review and Assess Broad Management Options
2. Develop Alternative Management Plans
3. Assess Alternatives to Determine Consistency with Technical Plans
4. Screen Alternatives in terms of Implementation Feasibility



### 3.8 COMBINED PLAN EVALUATION AND SELECTION

A. Combine Alternative Technical Plans that Meet Standards with Alternative Management Plans Corresponding to Technical Plans

B. Compile Information on Alternative Areawide Plans
1. Contribution to Water Quality and Other Related Water Management Goals of the Area
2. Technical Reliability
3. Monetary Costs
4. Environmental Effects
5. Economic and Social Effects
6. Implementation Feasibility
7. Public Acceptability

C. Compare Alternative Plans Select Final Plan
1. Effects of Alternative Plans
2. Vary Alternatives if Necessary for Final Plan Selection
3. Prepare Environmental Assessment of Selected Plan

D. Develop Detailed Description of Plan Features

E. Include Provisions for Performance Assessment, Plan Revision and Updating

### 3.9 PLAN OUTPUTS

A. Interim Outputs

B. Required Elements of State Water Quality Management Plans:

(a) Planning boundaries
(b) Water quality assessment and segment classification
(c) Inventories and projections
(d) Nonpoint source assessment
(e) Water quality standards
(f) Total maximum daily loads[1]
(g) Point source load allocations[1]
(h) Municipal facilities needs
(j) Nonpoint source control needs
(k) Residual waste control needs; land disposal needs
(l) Urban and industrial stormwater needs
(m) Schedules of compliance
(n) Regulatory programs
(o) Implementing and operating agencies
(p) Environmental, social, economic impact

---

[1] Not required in effluent limitation segments.

C. Provisions for Performance Assessment, Plan Revision and Updating

D. Condensed Report on Outputs, Full Report on Planning Process

### 3.10 SUBMISSION PROCEDURES

A. Adoption
B. Certification
C. Submission
D. Review/Approval
E. Revision

of these abatement measures is to be achieved through regulatory measures such as local ordinances and state legislation, capital construction of wastewater treatment facilities and through improved management of stormwater systems.

Since technical planning will be shaped by the particular problems of an area, the planning procedures in this guideline are offered primarily as an organizational framework for planning. Emphasis accorded each part of the framework will be largely a matter of planning judgment. In developing a water planning management strategy, however, particular attention should be paid to pollution controls other than traditional, capital intensive structural methods.

The technical planning process should be designed so as to place the greatest emphasis on water quality problems that are solvable with existing technology and sources of funding. The water quality problems that should receive the greatest priority initially are municipal and industrial point source problems, and nonpoint source problems that can be dealt with through better management practices and future stormwater systems that can be better designed. Lower priority should be placed on nonpoint source and stormwater problems that require large capital investments for their solution. For each type of water quality problem, however, priority attention should be placed on regulatory approaches which will help prevent problems from occurring and thereby lessen the need for remedial pollution abatement.

## B. Inputs

### 1. Information from 303(e) Basin Plans and Facilities Plans

Available information from Phase I 303(e) basin plans and facilities plans provide the basic inputs for planning. Facilities plans under Title II of the Act, or preceding facility plans under 18 CFR and Section 3(c) of the Water Quality Act of 1965, should be coordinated with State WQM Plans as stated in Ch. 2.

### 2. Information from NPDES Permits

Information on discharges into navigable water available through the National Pollutant Discharge Elimination System (NPDES) should be consulted. Terms and conditions of any permits already issued to dischargers should be accounted for in formulating pollution control strategies for the second round of permits.

### 3. Related Water Management Information

Much of the information necessary for developing an effective State WQM Plan may be available from related water management programs and studies. Those which may be especially useful include:

- Basin Studies under the Water Resources Planning Act;
- Urban Studies of the U. S. Army Corps of Engineers;
- Flood Plain Information Studies of the U. S. Geological Survey and the U. S. Army Corps of Engineers;
- State and Local Water Supply Studies and Data.

### 4. Goals Other than Water Quality

While the State WQM Plan is concerned with water quality, selection of the final plan may affect other community goals. It is therefore important to establish an understanding of community goals and plans, especially with respect to housing, economic development, transportation, education, recreation, other environmental goals, etc. The relationship between these goals and water quality and other environmental goals should be understood from the outset of the planning process. Public participation in the planning process is an effective way of defining the relationship between community goals.

### 5. Technical Information

A bibliography of technical studies related to the various parts of this guideline is provided at the end of this document.

## C. Conduct Water Quality Analysis

### 1. Establish Planning Boundaries - Element (a)

Ch. 2 provides guidance on initial selection of planning areas. Adjustments to initial planning boundaries may be desirable in order to encompass areas having particular water quality problems or in order to be coordinated with other planning activities in an area. However, modification of planning boundaries necessitates change in the State/EPA Agreement.

## 2. Specify Water Quality Standards and Antidegradation Policy - Element (e)

### a. Overview of Standards Revision Process

Recommendation for revision of standards is needed for two general situations: first, to adequately protect existing beneficial uses (including high quality waters for which existing standards are not stringent enough), and second, to propose upgrading of existing use classifications in order to achieve the 1983 goal in Section 101(a)(2) of the Act, wherever attainable.

In either of these situations, the recommended standards should include the following basic characteristics:

1) Appropriate Beneficial Uses Should Be Indicated and Categorized:

Beneficial uses would include water supply, propagation of fish, shellfish and wildlife, recreation, agricultural, industrial, and other uses of water including navigation. The existing water quality supporting these beneficial uses would have to be maintained, protected, or improved. These uses should be consistent with overall public health and the general welfare as opposed to particular needs for water use which might preclude enjoyment of other uses sought by the public in general.

2) Adequate Criteria To Support the Uses Should Be Included in the Standards:

Both narrative and numerical criteria should be specified at a level needed to protect the existing and proposed beneficial uses. The criteria should cover as many pollutant substances as are present or potentially present in a stream, and would require limitation in order to protect beneficial uses. The values chosen for numerical criteria should be consistent with those recommended in the EPA document, Quality Criteria for Water, published pursuant to Section 304(a) of the Act.

3) Antidegradation Policy:

The State should determine how existing water quality will be protected through implementation of appropriate point and nonpoint source controls to be specified in the State WQM Plan. If the State chooses to allow some deterioration of existing water quality, it must meet the requirements indicated in Part 130.17 as well as the substantive requirements of Federal law protecting existing water uses on Federal lands. The specific beneficial uses and necessary criteria to protect these beneficial uses should be indicated for waters to be covered by the State's antidegradation policy and implementation program.

4) Other Technical and Procedural Requirements:

In addition to the basic characteristics described above, the recommendation for standards revision and the development of an antidegradation policy should conform with the detailed technical and procedural guidance on standards revision contained in Ch. 5.

### b. Relationship between Standards Revision Process and State WQM Plan Development

General procedures for carrying out both the standards revision and plan development process are presented in Ch. 2.3.E and Table 2.2. The State is responsible for determining the schedule, interactions, and planning responsibilities under these procedures in the State/EPA Agreement. It is essential that the first three standards revision steps described for both protecting existing beneficial uses and upgrading uses be completed as expeditiously as possible in order to provide planning targets for the State WQM Planning Process. It should be possible to complete these basic steps without necessarily completing all the technical conditions of the standards revision process.

In preparing the proposed implementation plans for the standards policy, information and analysis on the costs and impacts of the standards policies should be developed. This information should enable refining the choices to be made regarding the stringency of antidegradation policy and the feasibility of upgrading use classifications in order to attain the 1983 goal.

## 3. Assess Water Quality Problems and Classify Segments - Elements (b), (d)

### a. Purpose of Water Quality Assessment

Once the boundaries of a planning area have been established, a water quality assessment should be performed to start the planning cycle. As more information becomes available, the cycle should be repeated annually and the assessment revised if necessary. Much of the initial assessment may be done on a preliminary basis. The main purpose of the assessment is to act as a first step to begin the area's Phase II Planning and also to act as a preliminary indication of the type and extent of the planning which will be necessary.

The water quality assessment and segment classification will provide inputs to all phases of the planning process in general, and specific inputs to several elements of the State WQM Plan. The assessment should provide the description of water quality called for in Section 305(b) of the Act. The assessment should also identify point and nonpoint source problem areas which should receive detailed analyses and waste load allocations. It will further provide inputs to the State Strategy and possible revisions to the State-EPA Agreement on timing and level of detail (§130.11).

The assessment and classification process will be discussed in the form of the following suggested steps to meet the requirement of elements (b) and (d):

1) Obtain Water Quality Data

The assessment should be based on all existing water quality data for the planning area. Sources for this information may include EPA's STORET System, Phase I State WQM plans, the U. S. Geological Survey, the Soil Conservation Needs Inventory, Bureau of Land Management, Bureau of Reclamation, and the U. S. Forest Service. EPA has published a nonpoint source control users handbook which provides additional information for nonpoint source data. Water quality data should be broken down according to types of receiving water.

Surface waters may be classified as free flowing streams, tidal rivers, estuaries, coastal zones, lakes, and reservoirs. Groundwater represents a separate category.

2) Compare Existing Water Quality to Phase II State Water Quality

Phase II State WQM Plans are to be based on meeting the 1983 goals of the Act. These goals will be reflected in Phase II Water Quality Standards. (See guidance on standards revision, element (e) in Ch. 3.6.C.2.)

Initial assessments may be conducted prior to revision and adoption of these standards. In this case, water quality should be compared to EPA's Quality Criteria for Water document prepared pursuant to Section 304(a) of the Act. This document lists criteria which describe various levels of quality for varying uses and habitats. The appropriate criteria should be selected on the basis of local conditions.

In comparing existing water quality data to water quality standards, the need for additional information will undoubtedly arise. This need may involve data for varying flow conditions (dry weather, wet weather, ice cover, etc.), data for NPS related criteria (sediment, nutrients, salinity, etc.), or simply additional data to increase the reliability of decisions made for critical areas. Requests for additional data should be prioritized and transmitted to State monitoring program personnel (§130.30). Based on immediately available data, comparisons between existing water quality and the levels of water quality needed to meet the 1983 goals should be made wherever possible.

### 3) Identify Existing and Potential Water Quality Problem Areas

Water quality problems must be identified. They should be described in terms of existing or potential violations of water quality standards. Approriate 304(a) criteria may be used in determining problem areas. Potential problem areas should also be identified on the basis of near violations during noncritical periods, trends in historical water quality data, and areas of projected development or growth (element (c)). The provisions of the State antidegradation policy (element(e)) apply to all waters of the State, but existing and potential problem areas should be identified for immediate action.

### 4) Specify Water Quality Standards Parameters which Are Violated

For each segment where water quality standards are violated, or expected to be violated, the violated parameters (including thermal) should be identified. The severity of the problem should be estimated from the degree and frequency of violations and the loss of desired beneficial uses.

### 5) Identify the Category of Sources which Contribute to Violations

Point sources contributing to any existing or potential water quality standard violation should be identified as municipal or industrial. Industrial sources should be further identified by industrial category. Contributing nonpoint sources (including upstream areas contributing to the build-up of the nonpoint source problem) should be identified by category and sub-category where necessary. The categories should be consistent with those identified in the State-EPA Agreement on timing and level of detail (§130.11). This step in the assessment process should provide inputs to revisions of the agreement as new problems are identified and others are found to be less severe than anticipated.

### 6) Identify Specific Sources Contributing to Violations

The assessment should identify specific point sources and limited geographic areas or owner/operators for nonpoint sources which contribute to existing or potential water quality standards violations.

The sources should be classified according to the flow condition under which they occur:

- continuing or seasonal point source
  (example: industrial source discharging continuously or on a seasonal basis)

- intermittent point source
  (example: storm and combined sewers discharge after rainfall)

- nonpoint source
  (example: runoff from agriculture, silviculture, construction, and mining)

Point source descriptions should be consistent with the source inventory produced under element (c).

### 7) Determine Segments Requiring Effluent Controls More Stringent than Base Levels

Some segments with existing or potential water quality standards violations will require controls more stringent than BPWTT and BAT to prevent water quality standards violations. On a preliminary basis, these segments should be identified for further analysis and classified as water quality segments. Analyses performed in connection with Phase I Plans should give good preliminary information, but it should be emphasized that all water quality standards criteria should be considered, including those related to nonpoint sources. Subsequent analyses performed to determine maximum daily loads (element (f)) may indicate that the segment is actually effluent limited and that it should be reclassified.

### 8) Determine Needs for Further Planning

At this stage in planning, the need for more detailed planning should be determined based on the following distinctions:

- Those areas where it is expected that the effluent limitations for point sources required by July 1, 1983 (BAT/BPWTT) will not be sufficient to meet the 1983 water quality goals will require detailed planning for both point and nonpoint sources. For point sources, waste load allocations will be necessary--see element (g). For nonpoint sources, a gross allotment for existing nonpoint source pollution loads will need to be established--see element (f). Detailed planning and establishment of nonpoint source control needs (element (j)) will also be necessary.

- All other areas will require application of the effluent limitations for point sources required by July 1, 1983 (BAT/BPWTT). Where the State has established a policy of antidegradation, higher levels of abatement than BAT/BPWTT, as well as Best Management Practices for new nonpoint sources may be required. However, if the State certifies, pursuant to §130.11, that no nonpoint source problems will exist over the planning period, the requirement for nonpoint source planning for new sources will not apply.

These determinations may result in a need to revise the State/EPA Agreement (§130.11) regarding the phasing and level of detail of planning.

## 4. Estimate Existing/Projected Wasteloads - Element (c)

### a. Municipal and Industrial Inventory

The inventories and projections should serve as a starting point for consideration of point source dischargers ranking. They should be of sufficient detail to allow decision makers and the public necessary information on the relative loading, rankings, and restrictions on sources. Inventories will also be utilized in the development of the annual State Strategy. Therefore, it may be appropriate to include sources with no loading, as in the case of non-overflow lagoons, in order that the total scope of water pollution control efforts for point sources may be realized.

In order to account for priorities between basins, States may choose to display the municipal priority list for an entire State, identifying those facilities within the priority area.

### b. Existing Land Use Patterns

Existing land use patterns should be categorized in such a way as to be able to assign pollutant loadings to the categories of land use. In the case of point sources of pollution, land use categories should be based on type of activity (e.g., commercial, industrial, residential). In the case of nonpoint sources, land use categories may be based on types of activity and also on the characteristics of the land on which the activity takes place (e.g., soil, slope, rainfall, cover, etc.), where appropriate, to aid in predicting pollutant loading from different land uses.

The size units of land categorized for purposes of predicting pollutant generation should vary depending on the degree to which the land is developed and the complexity of the conditions under which pollutants are generated. The size units recommended in the criteria for carrying out requirements of element (c) are for purposes of standardizing projections. Where the State or designated agency has a different method for classifying land use and different data bases, these may be used. Official planning agencies should be consulted in obtaining land use information.

### c. Demographic and Economic Projections

Estimates of the existing population, employment, and land use in the basin should be assembled as a basis for assessing existing patterns of the generation of pollutants, and as a basis for projecting the amount and spatial distribution of future wasteloads. These projections should cover the next 20 years in five-year increments. Particular emphasis should be placed on the effect that implementation of the State WQM Plan, local growth policies, plans for attainment and maintenance of air quality, and other regional plans for transportation, solid waste management, water supply, or public investment may have on historical trends of populations, employment, and land use.

Population data are available from the Bureau of Economic Analysis (U. S. Department of Commerce). They should be updated with the most recent demographic and economic projections developed by the Bureau of Economic Research Service (U. S. Department of Agriculture), and with projections used as a basis for State planning for air quality management. In general, SERIES E projections developed by BEA, or comparable projections developed by the State should be used as overall growth projections for the planning area. The use of any projections that deviate significantly from BEA should be justified. BEA projections are available for States, BEA economic regions, Water Resource Council Regions, and for Standard Metropolitan Areas, all of which generally include more than a single county. If it is necessary to disaggregate BEA projections, the assumptions made in the disaggregation process should be made explicit. Historical trends of county population and employment data are available upon request from BEA.

### d. Projected Land Use Patterns

Using the land use categories previously developed, and based upon the previous demographic and economic projections, future land use changes should be projected. The projections of land use planning agencies should be consulted in making these projections. Assumptions concerning the allocation of future population and employment to areas undergoing development should reflect commercial, residential, and industrial land use densities as established in approved land use plans (if such plans exist).

### e. Waste Load Projections

Based on existing data and projections of population and employment, and factors of wasteload generation per unit of area or unit of activity, existing wasteloads* should be estimated and future wasteloads projected for increments of five years, covering land areas and sources such as residential, commercial, and industrial. At a minimum, projections of municipal and industrial wasteloads must be made. Wasteload factors should be based on existing wasteload data for the area. Where it is necessary to project industrial loads, the load factors for industrial activities may be based on existing wasteload data for the area. Where it is necessary to project industrial loads, the load factors for industrial activities may be based on standard loading factors if specific forecasts cannot be obtained from industries planning to locate in the area. From the wasteload projections, as well as monitoring information, a materials balance (for the planning area) for each significant pollutant should be constructed to relate instream water quality to pollution generation and transport where possible.

---

*The wasteload factors used in the estimations should be specific enough to aid in the development of alternative abatement measures. For example, rather than relying on a single loading factor for agriculture or mining activities, a series of loading factors that are sensitive to variations in pollution generation should be developed for various subcategories of these activities.

While estimates of existing and projected nonpoint source wasteloads are not required plan elements, it is recommended that estimates of existing nonpoint source loading be developed. In the case of nonpoint sources, a materials balance may be based on average factors for wasteload generation per unit of area or unit of activity, depending on the nature of the problem. (Refer to Ch. 7). Generally, it is not necessary to attempt to project future nonpoint source loads, since the approach taken to nonpoint sources should be to establish best management practices for new nonpoint source activities. An exception perhaps exists where complex decisions regarding structural solutions (stormwater treatment, for example) are involved.

## 5. Estimate Maximum Allowable Load - Element (f)

In order to classify as water quality or effluent limited, it may be necessary to estimate the level of pollutant loading that could be allowed in the segment without violating water quality standards. This level could then be compared with the existing and projected wasteloads for the segment. However, the calculation of maximum allowable daily loads may require extensive data collection, analysis, and modeling. The State is only required to establish maximum allowable loads where it has classified the segment as water quality limited. However, where doubt exists as to proper classification, it is recommended that maximum allowable loads be established to make classifications more definite.

### a. Critical Conditions for Calculating Total Maximum Daily Loads

Critical or design conditions are those stream flow conditions which serve as the basis for determining if water quality standards can be met for each parameter. Stream flow conditions likely to present the greatest stress to fish, shellfish, and aquatic wildlife in the particular area should be chosen as critical or design conditions.

Traditional stream analysis often makes use of a low flow-high temperature design condition (e.g., once in 10-year, 7-day low flow). This flow condition may be appropriate for a steady-state stream analysis involving constant rates of point source pollutant discharge. However, choice of design flow conditions for point source analysis should take account of such factors as ice cover and seasonal point source discharge which may cause more severe stress on life in the stream than occurs at low flow.

Wet weather flow conditions may be appropriate for analysis of nonpoint and such intermittent point source discharges as storm sewers. Such factors as intensity and duration of rainfall, time since previous rainfall, pollutant accumulation rates (including effect of cumulative build-up of pollutants on bottom life in streams), and stream flow previous to rainfall should be considered in selecting design conditions for nonpoint source analysis.

A range of flow, meterological, and seasonal conditions should be considered in choosing design conditions. In general, for point sources, continuous discharges present the worst pollution under low flow, dry weather conditions. For pollutants transported in runoff, critical conditions will be rainfall-related, but may occur under a variety of flow conditions.

- Dry Weather Conditions

An analysis of the severity of pollution problems associated with dry weather conditions should be conducted. Dry weather flow conditions which are critical for maintaining biological life or recreation in or on the waters should be noted, a design condition for dry weather should be chosen, and its average duration and frequency of occurrence should be specified. In selecting the critical low flow condition, it should be kept in mind that emergency procedures may be required to meet water quality standards when the design flow condition is met or exceeded.

- Wet Weather Conditions

An analysis of the severity of pollution problems associated with wet weather stream conditions should be conducted. Any wet weather flow conditions which are critical in terms of maintaining biological life or recreation in or on the waters should be noted.

A design condition for wet weather flow conditions should be chosen, and its intensity, duration, and antecedent conditions specified (e.g., 1/2 inch rain per hour, for two hours, after two weeks of dry weather).

1) Relationship of Maximum Daily Load to Water Quality Standards

Each water quality standards parameter (including thermal) being violated or expected to be violated in the segment must be identified, and the total maximum daily loads of these pollutants which may be added to the water body by all point and nonpoint sources without violating the standard at the design condition must be determined.* This determination may require use of mathematical modeling (see discussion of models below).

Each total load limitation must be at least as stringent as necessary to achieve the applicable standard under the critical water quality conditions prescribed by the standards, and any conditions which should be anticipated in the individual situation, such as seasonal waste discharges. It must include provisions for seasonal variation and for a margin of safety which takes into account any lack of knowledge concerning the relationship between effluents and water quality as well as any uncertainty resulting from insufficient data, including data from nonpoint sources. Where thermal standards may be violated, thermal loads must be separately estimated as provided in §131.11(f)(2). For all parameters, the antidegradation principle applies (see Ch. 5 of these guidelines).

### 2) Seasonal Variation and Margin of Safety

The purpose of choosing a design condition for establishing total maximum daily loads is to determine a stream flow condition likely to cause severe stress on living organisms and to ensure that water quality standards are met even under these conditions. Design conditions should thus represent extremes in pollutant stress on the stream. It is possible, however, that even more extreme stresses might occur under more unusual climatic conditions. Thus, the choice of a design condition should include an estimate of the likelihood of more extreme conditions occuring.

---

*Because of the difficulty of predicting pollutant loading under wet weather conditions at the specific time interval of the design condition, it may be more practical to establish the maximum allowable load for runoff related pollutants over a longer time period such as a month or year. (This is only feasible, however, for non-biodegrading pollutant parameters.) Nevertheless, the long-term allowable load constraint should be sufficiently stringent so that peak loading at high flow periods would not be expected to violate water quality standards. Longer term allowable loads may be especially appropriate for bodies of water in which build-up of pollutants may be a problem (e.g., impoundments, lakes, estuaries, or problems of benthic deposits in general). The long-term allowable load should be such that the natural flushing capacity of the receiving water is not exceeded.

The margin of safety, on the other hand, should reflect lack of certainty about the characteristics of stream discharges. In the case of point sources, there may be considerable variation in the rate of loading of the discharge. The margin of safety should cover the possible coincidence of peak loading from these sources. Margins of safety for nonpoint sources should be based on the degree to which the magnitude of the existing nonpoint source can be calculated and the variability of the rate of loading under the design condition for which loads are established. The calculation of a margin of safety for nonpoint sources cannot be based on information on variability of individual discharges, but rather should be based on observed variability of gross loading from nonpoint sources, either in the particular area or as documented in the literature.

### b. Establishing of Thermal Loads

Same general guidance as for a. above.

### c. Proportion of the Maximum Daily Load for Point and Nonpoint Sources

For both dry weather and wet weather flow conditions, the maximum daily load consistent with meeting water quality standards should be broken down into the proportion of the load (for each parameter) from point sources (both continuous and intermittent) and nonpoint sources. This breakdown requires knowledge of the existing proportion of point and nonpoint loadings in the segment under the design flow conditions. Both point and nonpoint source loadings could be reduced proportionally to a level consistent with the maximum allowable load for all sources. However, there are a variety of procedures that could be used in load allocation.

A tradeoff between these loadings may be necessary in order to develop the point source load allocation under element (g). The allotment for point sources should be the basis for calculating individual point source load allocations, while the nonpoint source allotment should be used to determine the target level of nonpoint source loading reduction needed for all nonpoint sources. This target reduction for nonpoint sources will provide a guide in selecting the degree of abatement needed for each category of existing nonpoint source generating activities and in choosing Best Management Practices.

In establishing the gross allotment for nonpoint sources (which may contribute substantial amounts of the conservative substances), it is necessary to consider to what extent the loads established under wet weather conditions will be adequate when the flow in the stream subsides and the conservative substances remain as deposits in the stream bed.

An allowance for growth should be made in the allocation. The purpose of alloting some of the pollutant load to growth is to allow new municipal and industrial discharges to locate in an area without imposing wasteload restrictions that are far more stringent than those required of existing discharges.

The allowance that may be reserved for future growth should be calculated primarily for point sources, since it is not feasible to attempt to relate individual nonpoint source discharging activities to specific discharge amounts. The approach that should be taken toward new nonpoint source discharge is further explained in Ch. 7. In making an allowance for growth, there are a number of important considerations:

- The regulatory program required under element (n) should specify under what conditions new discharges would be allowed to locate in an area and include authority to restrict location of discharges so as to implement the allowance for growth specified in the plan.

- An allowance for growth in wasteloads must be consistent with the policy that the State adopts regarding antidegradation (see element (e).

### d. Use of Mathematical Models in Establishing Maximum Allowable Daily Loads

Modeling is generally the appropriate method of ascertaining total maximum daily loads and determining the effects of the proposed alternative abatement strategies. The modeling technique selected depends on the nature and complexity of the problem. The technique should represent the minimum level of sophistication needed to provide for wasteload allocations.

Results of modeling may reveal that previous segment classifications have not been accurate. After the modeling has been completed, segment classifications should be reviewed and revised if necessary.

## 6. Classify Segments

Water bodies may be classified as "effluent limited", where the base level effluent limitations required under the Act are sufficient to meet water quality standards. Where higher levels of abatement would be needed to meet standards, the water body should be classified as "water quality limited". Segment classification should be based on comparing the existing and projected loads with the maximum allowable load. However, if maximum allowable loads have not been established, and the segment meets water quality standards it can be classified as effluent limited. This classification cannot be assured if new waste loads were introduced to the segment. The development of abatement measures for various pollutant sources will depend on the segment classification.

### a. Effluent Limitations Segments

In any segments classified as effluent limited, application of Best Practicable Treatment is required of all point sources, other than publicly-owned treatment works by July 1, 1977, by which time owned treatment works are required to apply effluent limitations based on secondary treatment. By July 1, 1983, point sources other than publicly owned treatment works are to utilize Best Available Technology (BAT), while by such time, publicly-owned treatment works are to utilize Best Practicable Waste Treatment Technology (BPWTT).

In addition to the requirement to meet BAT/BPWTT, the State may establish an antidegradation policy in segments that can be classified as effluent limited based on the existing discharges to the segment. An antidegradation policy entails establishing definite limitations on further deterioration of water quality in given stream segments. Where the State seeks to establish such limits, it should classify the segment as water quality limited, since it will be necessary to develop maximum allowable loads and individual load limitations in order to carry out the antidegradation policy.

#### 1) Determine Applicable Effluent Limitations

Abatement plans in effluent limited segments should be based on the effluent limitations applying to particular point sources in the segment.

### b. Water Quality Limited Segments

In segments where effluent limitations are not sufficient to meet water quality standards, an analysis should be carried out to determine the most cost-effective means to reduce waste loads to the level required to meet standards.

The analysis should be completed for each pollutant which is in violation of water quality standards. Each source contributing that pollutant to the segment should be identified and alternative remedial measures considered. The final control strategy for the segment should reflect a combination of control methods which will meet water quality standards.

### 1) Select Eligible Sets of Waste Load Reductions to Meet Maximum Daily Load

The maximum daily load consists of a proportion allowed for point sources and an allotment for nonpoint sources. It is not necessary to allocate the allotment for nonpoint sources to particular dischargers. The allotment for nonpoint sources should be used as an overall guide in selecting abatement measures for such sources. On the other hand, the proportion of the total load that is established for point sources should be allocated to individual sources. There are many possible sets of individual point source load allocations. Alternative allocations should be considered in the process of developing point source abatement measures.

### a) Point Source Load Allocation - Element (g)

### (1) General Procedures for Point Source Load Allocation

The purpose of waste load allocations is to formally state the actions necessary to maintain or improve the quality of the affected waters. State and Federal water quality agencies must have waste load allocations (1) in order to establish a basis for assigning effluent limitations and issuing permits to individual dischargers in order to meet water quality standards and (2) to identify and provide a basis for ranking needs of municipalities for which planning and possible construction of federally-assisted facilities should be initiated within the next five years.

A State WQM Plan only prescribes the abatement strategy for individual sources generally. While the plan does not determine detailed engineering specifications for particular projects, some knowledge of alternative facilities and non-structural alternatives and their associated costs is obviously required to develop feasible, effective allocations which implement the water quality standards.

The allocations for each industrial or municipal discharger should result in a total effluent allowance. It should be recognized that restrictions may result in the discharger being forced to close or reduce its operation to avoid being subjected to possible enforcement actions (through action on a permit or other enforcement mechanism under State law). To determine feasible limts, the analysis should consider generally the alternative technical capabilities available to each discharger. Where standards are being violated because of point source discharges, the technical requirements for some point sources may be beyond base level effluent limitations. In addition, existing information on the trade-offs and total costs among combinations of alternatives for multiple sources should be reviewed in search of the mix of processes at all facilities which will result in the most efficient overall plan for achieving standards when all sources are in operation. Detailed consideration of technical and economic trade-offs between alternatives may be derived from 201 plans or in 208 plans for designated areas. Information obtained from the detailed analysis in 201 plans should be reflected in State WQM Plans.

### (a) Coordination with Permits

The Section 402 National Pollutant Discharge Elimination System Permit Program is designed to ensure that pollutant dischargers will not exceed prescribed levels. Since no permits may be issued for point sources which are in conflict with approved State WQM plans, the permit system provides an essential tool for implementation of plans.

Many first-round municipal permits expire on July 1, 1977, well before the scheduled completion of most plans. Thus, special efforts may be needed to coordinate some second-round municipal permits with ongoing planning. This coordination is most important where construction is scheduled at a facility within the life of its second-round permit.

In each State, the NPDES agency is responsible for drafting and issuing enforceable NPDES permits. The NPDES agency should inform the State and areawide planning agencies of proposed terms of permits affecting dischargers in their planning areas. (It is the responsibility of each planning agency to inform the NPDES agency of conflicts between draft permits and ongoing planning.) The NPDES agency should proceed to draft and issue permits prior to approval of WQM palns. Where early outputs are available from the State or areawide planning agencies, the NPDES agency should consider them during the drafting of permits, especially with respect to municipal facilities anticipating construction during the life of the permit.

The State planning agency is responsible for developing waste load allocations for all water quality limited segments. (The State may delegate this responsibility to local agencies.) The State planning agency should also review draft permits for dischargers in the State and inform the NPDES agency of any conflicts with ongoing planning.

For all dischargers within the boundaries of its area, designated areawide planning agencies are to:

. review all permits drafted by the NPDES agency to check for consistency with ongoing planning. This review may take place prior to or concurrent with the normal public participation procedures on permit conditions;

. inform the NPDES agency if any draft permit is not consistent with approved plans, approved parts of plans, or likely conclusions of the planning process.

In addition, all areawide planning agencies whose areas include water quality limited segments (or parts of water quality limited segments) for which waste load allocations already exist should review the waste load allocations, and transmit the findings of the review to the State and EPA.

In all areawide planning areas, the designated planning agencies may also undertake any of the following tasks, but only if the State specifically delegates the responsibility for these tasks to the areawide agency:

. revision of existing waste load allocations;

. preparation of waste load allocations where they are needed but do not already exist.

### (b) Coordination with Facilities Planning (40 CFR Part 35, Subpart E)

Facilities planning involves detailed planning directly related to the federally assisted construction of municipal waste treatment facilities. Such plans provide for cost effective and environmentally acceptable municipal waste treatment or control by determining the best practicable alternative waste management system over time, its geographic coverage, its service of other area sources, including industrial sources, and the nature and amount of the planned discharge (load reduction achieved).

The State WQM Plan will provide the following input to further facilities planning (also refer to element (h) in Ch. 3.6):

- service areas
- capacities and population served
- load reduction or level of treatment
- type of treatment
- preliminary cost estimates

Where detailed facilities planning reveals that information from the State WQM Plan does not accurately reflect particular conditions in an area, the State should be consulted so that these aspects of the State WQM Plan can be revised where necessary.

### (c) Relation to 208 Areawide Waste Treatment Management in Designated Areas

The division of planning responsibility between the State and designated 208 planning agencies is discussed in Ch. 2. The State has ultimate responsibility for developing and approving waste load allocations but may delegate the analytic work to other agencies including designated 208 agencies. Where the 208 designated agencies are revising or developing waste load allocations, the State must ensure that these allocations are consistent with the total maximum loads for upstream and downstream segments in the basin in which designated 208 planning is undertaken.

(d) Nonpoint Sources

In allocating pollutant loads among point sources, the pollutant contribution from nonpoint sources should be considered to assure that the combined total will not exceed applicable water quality standards. Such contribution should be separately entered in the load allocation display. The long term point source load allocations may depend upon the abatement and control alternatives for nonpoint sources.

(e) Accomodation of Future Growth

Growth trend information compiled for the segment should be considered and a determination made as to the load allotments, if any, to be reserved for future discharges. The allotment must be consistent with continuing achievement of standards and prevention of significant water quality degradation (see Ch. 5). The growth allotment should be separately displayed in the reported load allocation.

(f) Upstream Contribution

The amount of pollutants entering the segment from upstream should be considered when determining whether the total of proposed individual point and nonpoint allowances exceeds the allowable maximum (see element (f)). For purposes of notation and calculation, the estimate of this contribution necessarily involves coordination with planning for the upstream segment. The method of coordination, level of certainty regarding the estimated future load, and the time span covered is a matter of planning judgement.

(2) Load Allocation Techniques

Load allocation involves planning for many uncertainties such as uncertainty with respect to growth projections; a lack of knowledge of cause-effect relationships between effluents and water quality; pending decisions with respect to the construction of reservoirs, withdrawals, and other developments which could significantly affect the assignment of effluent limitations; and uncertainty as to the quality of the data being employed. Recommendations on how to deal with these problems of uncertainty are as follows:

(a) Growth Projections

Unanticipated growth occuring during the period covered by the plan could cause water quality conditions to deteriorate. The classification of some segments may change from Effluent Limitation to Water Quality; or, in Water Quality segments higher levels of technology could be required to achieve standards. Since the rate of growth of waste loads is controlled by local decisions with respect to annexation, industrial expansion, sewer connection permits, etc., the plan's load projections and allocations must be reviewed with the responsible municipalities and industries. The regulatory program (see Ch. 9) should provide regulation over new waste discharging facilities consistent with the State WQM Plan.

### (b) Lack of Cause-Effect Knowledge

Uncertainty due to a lack of knowledge of the cause-effect relationships among waste loads and water quality must be taken into account in the waste load allocation process to provide a basis for specifying tolerance levels for prediction errors. Where the cost of errors is relatively small, factors of safety should be included; where the cost of errors is large, an ongoing monitoring program should be developed to improve the quality of the data used in the waste load allocation process.

### (c) Pending Development

Where there is substantial uncertainty with respect to pending development decisions, allocations should be made under both the assumption that development will not occur and that the development will occur. Water quality implications of the proposed development should then be brought to the attention of the decision-makers concerned with the project.

### (d) Uncertainty as to the Quality of Data

High levels of confidence in the data should exist where the costs of possible error are large. Lower confidence levels can be tolerated where the resulting costs of error are small. Additional confirmation of data should be sought where the costs of possible error are large.

Because of the variations that will exist in the quality of information that can be used in load allocation, there are no generally applicable load allocation decision rules that should be applied in all situations. In general though, anticipated violations result from one of three situations: pollution primarily from nonpoint sources; pollution primarily from treatment plant effluents after the achievement of base level limitations; or pollution from treatment plant effluents and nonpoint sources of comparable magnitude. Allocations under each of these conditions could be as follows:

- Dominant Nonpoint

  Where water quality standards would not be achieved after the application of Best Available Technology (BAT) by industrial and BPWTT by municipal point sources, and the remaining violations are predominantly caused by nonpoint sources, loads should be allocated to point sources according to BAT/BPWTT treatment limitations, since water quality would not be significantly improved through the application of higher effluent limitations. Overall levels of nonpoint source load reduction needed to meet standards should be established (e.g., the gross allotment for nonpoint sources referred to in element (f)). This allotment should be used in determining Best Management Practices for nonpoint sources (see Ch. 7).

- Dominant Point

  Where pollution from point sources after the application of BAT/BPWTT is the dominant cause of anticipated violations, loads should be allocated to achieve water quality standards in a cost-effective manner, including allocations requiring higher levels of treatment or control. In segments where previously developed plans are available and up to date, these plans may be sufficient to assign waste loads to individual sources. In other segments, evaluation of alternative load allocation strategies is necessary to determine the most cost-effective strategy for achieving water quality standards. Waste loads should be allocated consistent with the preferred strategy.

- Comparable Point and Nonpoint

  Where pollution from nonpoint sources after the application of BAT/BPWTT treatment, and pollution from nonpoint sources are of comparable magnitude, the tradeoffs between overall point and nonpoint load reduction should be considered, and a gross allotment for nonpoint sources established, as discussed in regard to dominant nonpoint areas.

  Evaluation of tradeoffs between point and nonpoint source abatement should be carried out only at the level of detail required to execute the waste load allocation process.

The evaluation should not reach the level of engineering design, but should consider the nonstructural alternatives.

Whatever the cause of water quality problems, the following assumptions on low flow and wet weather flow conditions may need to be employed in allocating to point sources and establishing the gross allotment for nonpoint sources.

### (e) Low Flow Conditions

Continuous or seasonal point source allocations should generally be made for dry weather low flow conditions, or whatever other critical design condition is chosen for establishing maximum allowable daily loads.

Intermittent point sources and nonpoint sources that are rainfall related may not be present under low flow conditions. Therefore, the load allocation to point sources under low flow conditions will be similar to the situation described as dominant point source above.

Nevertheless, at low flow there may be nonpoint source problems due to in-stream deposits of material accumulated from point and nonpoint sources. To the extent that the low flow water quality problem is caused by the deposit of material under high flow conditions from nonpoint sources, the reduction of this load will help alleviate the problem. If this is the case, the point source load allocation options may be similar to those described as comparable point and nonpoint above.

### (f) Wet Weather Flow Conditions

Continuous or seasonal point source allocations should first be established for low flow conditions. These allocations should be maintained for high flow conditions unless it is possible to write permit conditions that would allow waste loads to vary depending on stream flow.

Assuming a constant load allocation for point sources (based on low flow), the waste load reduction needed to meet standards under wet weather flow conditions will have to be borne by abatement of nonpoint sources. In other words, some of the remaining portion of the maximum daily load for the stream, after imposition of waste load allocation for point sources (based on low flow) will be equivalent to the gross allotment for nonpoint sources. Further guidance on how to determine nonpoint source abatement approaches to meet this gross allotment is provided in Ch. 7.

### (3) Relationship Between Individual Load Allocations and Maximum Daily Load to the Segments

Because a segment may encompass considerable stream length, it is possible that there will be variation in the assimilative capacity, especially for biodegradable pollutants, depending on the location of the discharge points along the segment. In such cases, mathematical models should be used to determine whether the pollutant loadings are compatible with meeting water quality standards at each discharge point. In some cases, the sum of the individual discharges may exceed the maximum allowable daily load. If this proves to be the case, the maximum allowable load should be revised to account for the configuration of discharges that may be proposed.

### (4) Consistency of Growth Assumptions; Implementation of Allowance for Growth

The growth allowance used in the waste load allocation process must be compatible with the growth projections made under element (c). A regulatory program (element (n) below) should be developed to assure that any new discharges introduced into the area are within the allowance for growth of wasteloads.

### (5) Relationship with Permits

After wasteload allocations have been established, the target abatement dates and schedules of compliance to include as terms in permits should be described under element (m) below.

## 2) Test Sets of Wasteload Reductions to Determine Consistency

The analytic model discussed earlier in this chapter should be used to determine whether wasteload allocations for continuous point sources enable meeting standards. The choice of a tolerance level and the rationale for that choice should be explicity stated.

It is not necessary and probably not feasible to attempt to model the receiving water impact of the load reductions assigned to intermittent point sources and nonpoint sources, as this may require highly sophisticated analytic modeling and more extensive data requirements than can be met during the planning period. It is only necessary to determine whether the predicted load reductions for intermittent point and nonpoint sources enable meeting the single gross allotment or target abatement level for these sources.

Because some proportion of wasteloads may be reserved to allow for future growth in the area, it is important that the wasteload allocation process be undertaken in close coordination with agencies possessing land use planning and control authority. Management of new wasteload discharges in the area should be carried out through the regulatory program for implementing the plan (see Ch. 9).

## D. Choose Approach (and Level of Detail) for Relating Water Quality Constraints to Abatement Measures

After the water quality analysis has been conducted, it should be possible to specify the categories of sources for which detailed control plans are needed. As explained in Chapter 3.3.C, where it is not clearly established that particular problems exist or that implementation measures can be undertaken in the next five years, the implementation program for these sources (elements (h)-(o)) can be developed in the form of an assessment of control needs. At this point in the planning process, decisions can be made concerning the level of detail in which abatement measures can be made concerning the level of detail in which abatement measures will be developed.

Maximum allowable daily loads (MAL) for each pollutant parameter and each segment provide a total load constraint which can be met through many possible combinations of load reductions from different sources. There are basically two approaches that can be used to match up the different possible load reduction sets to the maximum allowable daily load:

1. Area Approach: Compare the alternative abatement measures for the entire area in order to meet the MAL for each parameter in the most cost-effective manner.

The area approach may enable an optimal selection of controls. This approach is appropriate where many sources are suspected of contributing to a particular pollutant parameter. Urban concentrations are likely to present complex sources of pollution. To assign a certain load reduction at low flow to municipal sources and another to industrial sources without considering the most cost-effective load reduction could lead to an uneconomic solution. In fact, the point source load allocation program normally does consider alternative reductions by different point sources. However, the area approach could also be applied to nonpoint sources. For example, load reductions assigned at wet weather flows to stormwater and rural runoff could be varied in order to choose the least cost solution for reducing the existing sediment problem. The main shortcoming of this approach is that it requires a great deal of information on the relative loading from different sources to be available before load reductions can be assigned to the sources.

2. Category Approach: Allocate a proportion of the MAL for each parameter to the various source categories. Within a particular source category, the most cost-effective combination of controls would be chosen.

The category by category approach may be more appropriate where particular categories of sources contribute to violations of given parameters. The reduction of the loading of the violated parameter can readily be assigned to a few categories of sources according to simple allocation techniques. More guidance on these techniques is presented in Ch. 7.

### a. Establish Categories

In order to isolate particular pollution problems and concentrate planning efforts on these problems, it is important to define the spectrum of possible problems of which a particular category of sources is a part. A classification system should therefore be developed to cover all pollution problems. In the case of municipal and industrial sources, the classification is straightforward. For runoff related sources, a system of classification should be developed based on the factors that influence pollution generation--both natural features and man-made activities. Classification of nonpoint sources is further discussed in Ch. 7.

### b. Allocate Waste Load Reductions from Step C.5. to Each Category of Sources

A number of decision rules can be employed in allocating waste load reductions to particular categories and subcategories of pollution sources:

#### 1) Proportional Reduction

This approach would involve dividing the allowable load among all pollution-generating categories in proportion to the existing extent of activity of the various categories. For example, the nonpoint source allotment would be allocated in proportion to area occupied by nonpoint source activities. The point source allotment would be allocated in proportion to existing rate of pollutant loading, existing dollar production level, or some other equitable basis. The advantage of this approach is the stress on equity; the disadvantage is that it requires extensive information and relies on an arbitrary basis for allocation.

#### 2) Equal Relative Reduction Approach

This approach involves determining a relative reduction from existing instream pollutant loads by all sources to meet the maximum allowable load for a particular parameter. This relative reduction level would be applied in relation to the existing rate of pollution generation by each category in order to determine load reductions for the category. The advantage of this approach is that it is simple and equitable. The disadvantage is that it may not be very efficient for all polluters to reduce their pollution loading by the same proportion.

#### 3) Best Technology Approach

This approach involves selecting the degree of reduction for each category of sources based on the abatement efficiency of the technology for each category. If reduction levels for all sources were determined by this approach, they might not correspond to the maximum daily load for a segment. Upward or downward revisions in abatement requirements would need to be made after assessing the impact of applying the best technologies for each category of sources. The advantage of this approach is that it allocates the burden of cleanup to those categories or sources having the technical capability to assume the burden. The disadvantage is that the best technology does not necessarily correspond to the pollution abatement needs of particular areas.

More complex decision rules combining proportional reduction with specified base levels of reduction for each category could be formulated. The principal problem in allocating waste load reductions, however, is the uncertainty inherent in predicting the magnitude of pollution problems with or without control. Methods for predicting pollution loading in runoff are discussed in Ch. 7. The advantages and limitations of these methods should be considered in choosing decision rules for allocating load reduction to various categories of pollutant sources.

Once decision rules have been chosen for allocating load reduction, reduction levels should be assigned for each parameter to each category (and sub-category) of sources. It is also possible that the choice will be made to allocate load reductions on a category by category basis only to sources occuring under wet weather flow conditions. This could be accomplished by making a "gross allotment" of the MAL between point and nonpoint sources and following the area approach to allocate loads to individual point sources and the category by category approach to allocate load reduction to nonpoint sources.

## E. Develop Abatement Plans

### 1. Area Approach

#### a. Determine Alternative Area Sub-Plans to Meet Eligible Load Reductions/Effluent Limitations

Chapters 6-8 provide a framework for developing pollution control options for point and nonpoint sources. The alternatives that are presented as the result of detailed planning for point and nonpoint sources are referred to as subplans. These subplans encompass elements (h)-(m) of the required plan elements. These elements are described on pages 3-56 ff.

In order to develop subplans, it is helpful to examine the patterns of existing and projected wasteloads by display on land use maps. Alternatives for point and nonpoint source control, and means to implement these controls, may be developed through an examination of alternative land use and land management practices. (See Ch. 6.) It should be emphasized that the detailed land use-water quality analysis described in Ch. 6 is an optional approach for development of abatement measures.

Subplans may be broken into three major types according to the category of sources and design conditions to which they apply:

1) Continuous or Seasonal Point Source Subplans

Continuous point sources are municipal treatment works and industrial point sources. Some industrial point sources may discharge on a seasonal basis. Detail on preparing this subplan is provided in Ch. 8.

2) Intermittent Point Source Subplans

Intermittent point sources are wet weather related point sources such as combined sewer overflows. Detail on preparing this subplan is provided in Chapters 6, 7 and 8.

3) Nonpoint Source Subplans

Nonpoint sources are primarily wet weather related. Detail on preparing this subplan is provided in Ch. 7.

For purposes of comparing alternatives, each subplan should furnish information on the following (this information encompasses some of the required information for each plan element):

- Wasteload characteristics of each alternative expressed in appropriate units;
- Total cost of each alternative expressed as its present value or average equivalent value of capital and operating costs for the overall alternative and subsystem components;
- Information on the reliability of each alternative and subsystem included in each alternative;
- Significant environmental effects of each alternative consistent with NEPA procedures, including a specific statement on future development impact;
- Contribution of each alternative to other water-related goals of the planning area.

b. Screen Subplans

Control options under each subplan are numerous. Thus, the number of possible subplans may be so great as to impede consideration of logical alternatives. Since the only subplans that are viable are those which the management agency(s) can implement, it is important at this stage to integrate the results of management planning with those of technical planning.

c. Combine Subplans into Alternative Plans

At this step, viable subplans should be combined into alternative technical plans for final evaluation and selection. This is not meant to preclude reconsidering options previously screened out, but merely to provide a convenient form of organizing a vast number of potential control alternatives into a reasonable number to evaluate.

2. Category Approach

a. Develop Alternative Controls for Each Category of Sources to Meet Load Reductions/Effluent Limitations

For each category to which a load reduction has been assigned, alternative control plans should be prepared. These control plans should provide the specific information required under elements (h)-(l), which are further discussed below. For purposes of comparing alternatives, such control plans should furnish information on the following (this information encompasses some of the required information for each plan element):

- Wasteload characteristics of each alternative expressed in appropriate units;
- Total cost of each alternative expressed as its present value or average equivalent value of capital and operating costs for the overall alternative and subsystem components;
- Information on the reliability of each alternative and subsystem included in each alternative;
- Significant environmental effects of each alternative consistent with NEPA procedures, including a specific statement on future development impact;
- Contribution of each alternative to other water-related goals of the planning area.

These subplans encompass elements (h)-(m) of the required plan elements. Guidance on these elements is provided below. It should be noted, however, that requirements of the regulation must be met under both the area approach as well as the category approach.

1) Municipal Facilities Needs -- Element (h)

Guidance is provided in Chapter 8.

2) Industrial Facilities Needs -- Element (i)

Guidance is provided in Chapter 8.

3) Nonpoint Source Control Needs -- Element (j)

a) Summary of Needs

§131.11(j)(1) calls for a summary of the nonpoint source control needs of a State. This statement of needs should be broken down by type of nonpoint source problem (the categories established under element (d)) and planning area or subarea as delineated in element (a). This summary should be based on the analyses and evaluations discussed in (b) and (c) below.

b) Nonpoint Source Analysis and Evaluation

For each nonpoint source category, in each planning area, there should be an analysis of the alternative control measures from which Best Management Practices could be chosen. A procedure for choosing Best Management Practices is presented in detail in Ch. 7. The procedure calls for a distinction between new and existing nonpoint sources in each category. The distinction between "existing" and "new" nonpoint source activities will be left to the discretion of the State. General guidance on how this distinction could be made in practical terms is presented in Ch. 7. The rationale for this distinction is that it is practically impossible to anticipate the magnitude of future nonpoint sources. Thus, controls for existing nonpoint sources should be related to a gross allotment for such sources, whereas controls for new nonpoint sources should be set at a level which would protect water quality from further deterioration. The analyses of nonpoint source controls should present alternatives for both new and existing sources. For each alternative, the information listed in the regulation and criteria for meeting the regulation should be presented. Guidance on developing regulatory programs and choosing implementing agencies is presented in Ch. 9.

c) Nonpoint Source Categories

The nonpoint source categories established in the Act and the Part 131 regulations should be used as a basis for establishing the categories of nonpoint sources for which planning will be undertaken. However, since Section 201(c) provides a general mandate for 208 planning to "provide control and treatment of all point and nonpoint source of pollution, including in place or accumulated pollution sources," these categories should not be interpreted to exclude any nonpoint source problems. If needed to carry out the mandate of Section 201(c), additional categories or subcategories of nonpoint sources should be established for purposes of planning. Chapter 7 provides guidance on how to establish nonpoint source categories for purposes of planning.

### 4) Residual Waste Control Needs; Land Disposal Needs -- Element (k)

#### a) Disposal or Utilization of Residuals from Treatment Processes

The municipal and industrial needs assessment should include a preliminary identification of the residual waste disposal or utilization option for each facility. Further guidance is contained in Chs. 7 and 8.

#### b) Land Disposal of Pollutants

The nonpoint source planning process should include establishment of Best Management Practices for land disposal of pollutants, for both existing and new sources in this category. Refer to Ch. 7 for further guidance.

### 5) Urban and Industrial Stormwater Systems Needs -- Element (1)

#### a) Analysis of Existing Problems

The general procedure for nonpoint source planning is presented in Ch. 7.

#### b) Analysis of New Stormwater Systems

Assuming that modification of the existing drainage pattern is categorized as a "new" nonpoint source category by the State, the procedure for establishing Best Management Practices for new nonpoint sources (Ch. 7) should be followed. Guidance on regulatory programs for implementing controls is found in Ch. 9.

#### c) Cost Estimates

The cost estimates should be of a generalized nature since the assessment of stormwater needs and performance criteria for new systems will not include detailed engineering designs. The cost estimates need only be detailed enough to enable decisions concerning cost effectiveness of various alternatives. See Ch. 11 for further information on stormwater abatement cost estimates.

### 6) Target Abatement Dates (Schedules of Compliance -- Element (m)

#### a) Effluent Limitations

Effluent limitations must be established for significant point sources in any water quality segment. Limitations must be set forth for every pollutant discharged by the source. Effluent limitations established in any current permit must be at least as stringent as necessary to meet the requirements of the Act and applicable regulations, and, for parameters for which load allocations are required, the load allocations established for each source.

The Administrator is publishing effluent guidelines defining Best Practicable Waste Treatment Technology for municipal facilities and Best Available Technology for various classes and categories of industrial point sources. Copies of the guidelines and information regarding them may be obtained from the Regional Administrator. Stricter than base level limitations must be developed where the base level restrictions would not result in compliance with the source's load allocation and with water quality standards,

#### b) Target Abatement Dates

Target abatement dates or schedules of compliance must be determined for point sources which are not currently in compliance with the effluent limitations. If the State is participating in the NPDES, target dates for the processing of permits for any source which will not have been processed at the time of the State WQM Plan completion must also be set forth.

Major milestone dates from the schedules of compliance established by current NPDES permits must be included in the segment analysis. Target abatement dates must be developed for all other significant sources and for any source having a permit with an incomplete schedule.

Each schedule of compliance or target abatement date should reflect stringent performance goals to assure implementation of the plan's required effluent limitations in the shortest practicable time. However, all dates established by the plan must be realistic and feasible. The schedules or targets should provide for timely implementation of statutory goals.

## 3.7 Management Planning

### A. Purpose

The key implementation and enforcement provisions for State WQM Plans are delineated in Section 208(b)(2)(c) and (c)(2) of the Act. The Act requires that authority to carry out the above provisions be vested in a designated agency or agencies within a planning area. The purpose of management planning is to select a management agency or agencies and to develop appropriate institutional arrangements through which the plan can be implemented. Institutional arrangements are the formal structure of affected state and local units of government for planning and implementing a water quality management plan.

The Act clearly specifies the responsibilities and functions of the management agency(s). The criteria that should be used to determine whether the management agency(s) can properly carry out these responsibilities are:

- adequate legal authority
- adequate financial capacity

The Act does not, however, stipulate what institutional arrangements should be utilized to enable plan implementation. Criteria for evaluating the adequacy of the management agency(s) and institutional arrangements should be:

- Practicability -- To what extent do institutional arrangements rely on existing water quality management agencies? Are the institutional arrangements politically feasible?

- Managerial Capacity -- To what extent do institutional arrangements provide for program oversight including procedures for resolving conflicts and cooperating with other areawide planning activities?

- Public Accountability -- To what extent do institutional arrangements provide for a decision-making process accountable to the area electorate?

### B. Functions of Management Agencies

To ensure plan implementation, the management agency(s) and the supporting institutional arrangements need to carry out the following functions:

### a. General Management Program

One of the most important functions of management agency(s) is to provide general direction for the implementation of the plan. The management responsibilities involved in directing plan implementation should include:

. program supervision and coordination, e.g., ensuring that the program is being implemented, that the program is being coordinated with other programs in the area, and that the performance of the program is being continually assessed;

. continuous planning, e.g., updating the plan and implementation mechanisms as required by changing conditions;

. fiscal management, e.g., assuring that adequate resources are provided to implement the regulatory and waste management programs as well as to finance the administration and continuous planning functions of the management agency(s).

### b. Regulatory Program

Authority to carry out the regulatory program mandated in Section 208(b)(2)(C) is required. In addition to authority to regulate existing and new pollution sources, administrative procedures and agencies responsible for implementing the regulation need to be specified. The regulatory program will be one of the vehicles for enforcing the abatement measures that have been developed through the technical planning process. In addition to direct regulation, appropriate tax policies should be developed to complement the regulatory program.

### c. Waste Treatment Program

The legal authority and financial capacity needed for operating, maintaining, and constructing waste treatment works and otherwise carrying out a plan is described in Section 208(c)(2) of the Act. A waste treatment program includes all the capital construction responsibilities to carry out a plan, such as publicly owned treatment works as well as all other public sector programs for abating pollution which may include residual waste management, stormwater management, and nonpoint source management.

## 2. Management Agency(s) and Institutional Arrangements Capable of Implementing the Plan

The great variety of local institutions, practices, and experience dictates that a pragmatic strategy be followed in selecting management agency(s) and formulating institutional arrangements. The arrangements may be comprised of one or more agencies, which may be existing or newly created and local, regional, or statewide in jurisdiction, and may also rely on intergovernmental agreements.

Although care should be taken to ensure that the institutional arrangements fit the local situation, excessive fragmentation of authority and responsibility should be avoided. The greater the number of agencies involved in implementing the plan, the greater the need to coordinate between the agencies. The complexity of institutional arrangement should not prevent a clear delineation of the decision-making process used to implement the plan. In particular, there should be an explicit arrangement for ensuring overall supervision and enforcement of the management plan.

## B. Define Characteristics of the Regulatory Program and Management Agency(s) and Institutional Arrangements to Meet Requirements of the Act

The first step in management planning should be to determine the technical solutions to water quality problems that have been proposed for the area. For each technical solution, there should be adequate authority to implement the solution (through regulatory and waste treatment programs), proper financial arrangements and agency(s) responsible for implementing the solution. A description should be made of the needed authority, financial, and management arrangements as required by the Act and Part 131 regulations, in terms of the particular technical solutions proposed for the planning area. This description should be based on meeting the provisions of elements (n) and (o) of 40 CFR, Part 131.11 (see pages 3-56 ff). The description may be arranged under the following headings:

- Legal authority and financial capacity for:
    - General management program;
    - Regulatory program;
    - Waste treatment program.
- Management structure and institutional arrangements to carry out functions.

### 1. Regulatory Program -- Element (n)

Chapter 9 provides overall guidance on how to develop regulatory programs -- from inventorying existing regulations to developing new regulatory proposals. The following guidance pertains to various provisions of the regulation:

a. Establishment of Areawide Regulatory Programs (Existing Sources)

In developing regulatory programs, it is important to ensure an areawide approach; that is, similar problems should have similar solutions. This necessitates coordination between planning done for similar problems.

Although this does not necessarily require a common management agency for each problem, there should also be coordination between management agencies that are implementing controls for similar problems.

To document the need for the regulatory controls that are chosen, the State Water Quality Management Plan should relate the maximum allowable pollutant load identified in element (f) to the regulatory controls that are chosen to reduce existing levels of pollutant loading to a level consistent with the water quality goals. Regulatory controls should be established for each category of sources.

The following characteristics of regulatory programs (for existing and new sources) are discussed further in Ch. 9:

- overall legal authority to regulate the activity (e.g., the police powers of the State or specific enabling law);
- a specific form of regulation for existing and new polluting activities (e.g., permit, license, land use control) applicable to specified parties under specified conditions;
- an administrative agency to supervise and enforce implementation of the regulation;
- technical specifications regarding the type of abatement measure required for each source (e.g., Best Management Practices for nonpoint sources, residual waste, land disposal, and new stormwater systems.)
- adequate due process requirements to safeguard the interests of the regulated parties (e.g., adequate notice, hearings, appeals.)

b. Pretreatment Regulatory Program

Section 307 of the Act concerns pretreatment requirements governing discharge of pollutants into publicly owned waste treatment works. Regulations for Section 307 should be consulted in developing local pretreatment regulatory programs.

In addition to the national pretreatment requirements, an analysis should be conducted of acceptable levels of influent quality for discharges into the particular treatment plants in the planning area. It is particularly important to consider what tolerance the treatment processes have for toxic waste loads. It is also important to consider the quality of the sludge from the treatment plants, since the presence of toxics and heavy metals may restrict beneficial uses of sludge.

The characteristics of a regulatory program needed to meet the requirements are discussed further in Ch. 9.

c. Establishment of Areawide Regulatory Program (New Sources)

The choice of regulatory controls for new pollutant sources should be based on the abatement needs for point sources needed to meet relevant waste load limitations, and the degree of abatement of nonpoint sources needed to protect water quality from further deterioration. The procedure for selecting nonpoint source controls for new sources is discussed in Ch. 7.

The characteristics of a regulatory program needed to meet the requirements are discussed further in Ch. 9.

d. Choice of Best Management Practices

The documentation of the degree of abatement needed for controls for existing point and nonpoint sources is discussed above. In addition to documenting that Best Management Practices have been chosen, the plan should describe the relationship between Best Management Practices for different categories of sources and the State's ongoing monitoring program. The monitoring program should provide information that can be used to evaluate the effectiveness of the BMP's adopted by the State.

2. Implementing and Operating Agencies -- Element (o)

a. Agencies Responsible for Carrying out Plan Elements

The plans will generally include the following ways of implementing pollution abatement:

- Waste treatment plant construction;
- Municipal and industrial effluent limitations, pretreatment standards, and sewer use regulations;
- Best Management Practices for new and existing nonpoint sources, urban runoff, residual wastes, and land disposal.

Each of these means will require designating a management agency or agencies to implement the abatement requirements. In general, municipal and special sewerage districts should be chosen to implement the facilities operation and construction component of the plan; the State should assure that municipal and industrial effluent limitations are followed; the jurisdictions and agency(s) responsible for facilities operation and construction should develop and enforce pretreatment regulation and regulation of sewer hook-ups; a combination of local, county, State, and special purposes agencies should be responsible for developing and implementing regulations requiring BMPs.

The institutional structure and arrangements for supervising and carrying out the plan are further discussed in Ch. 9.

### b. Authority and Financial Capacity of Management Agencies

Chapters 9 and 10 provides more detailed discussion of legal authority and financial capacity of management agencies.

## C. Conduct Management Analysis

The next step in the management planning process should be an analysis of the area's experience in water quality management. The purpose of this analysis will be to evaluate the capability within the area to meet the management requirements of Section 208 and to develop an understanding of what is needed to satisfy these requirements. Some of the analysis will have been accomplished in the designation and grant application stages. During the planning process, this preliminary assessment should be reviewed and, where necessary, expanded to assure its accuracy and thoroughness. The following analyses should be provided:

1. An assessment of the specific legal authority required under Subsection 208(c)(2) and 208(b)(2)(C) to carry out the regulatory and waste management programs and an approach for acquiring such authority. The approach should delineate what enabling or supplemental legislation would be necessary, the type of contractual agreements that might be employed, and the possibility for adapting to existing laws. In instances where existing laws might be broadly interpreted as furnishing the required authority, but where such interpretation may be subject to dispute, it would be best to seek specific statutory sanction.

2. An evaluation of existing financial arrangements to determine what changes will be necessary to provide affected agencies with the capacity to meet financial needs and obligations for carrying out general management responsibilities, the regulatory program, and waste management program.

3. An assessment of the potential of existing institutions in the area to perform the required functions. An overall assessment should be made of the area's potential for regional water quality management. This evaluation should seek to assess the effectiveness of regional management to date and the strength of the area's traditions and commitment to regional approaches. The evaluation should incorporate an appraisal of the relationships between federally funded regional planning authorities and regional or local water quality management agencies such as transportation, land disposal of wastes, land use planning, and water supply where such agency activities affect water quality. The purpose of the evaluation is to help ensure that implementation plans are constructed on a realistic foundation which reflects the area's experience in regionalized management.

### D. Develop Alternative Management Plans

Upon completion of the management analysis, alternative management plans reflecting the results of this analysis should be developed. These management plans should meet the provisions for elements (n) and (o) of 40 CFR Part 131. In most cases, only a limited number of alternatives will be appropriate. Close coordination with the technical planning component of the planning process will be necessary throughout this stage to ensure that the management alternatives developed are consistent with alternative technical plans. As an initial step in the formulation of management alternatives, the broad options available should be reviewed and assessed. Careful consideration should be given to the advantages and constraints of these options in relation to the designated areas. Once developed, the implementation alternatives should be screened in terms of their feasibility according to the criteria discussed previously. An overall assessment of the implementation feasibility of the alternatives for management agency(s) and institutional arrangements should be based on all the criteria discussed.

## 3.8 Combined Plan Evaluation and Selection

The regulations on State WQM Plans do not specifically require that alternative plans be developed and evaluated. However, given the complexity of the choices involved in developing State WQM Plans, it is recommended that a systematic evaluation of alternatives be undertaken where necessary. This section of the planning process suggests procedures for plan evaluation and selection.

### A. Combine Alternative Technical Plans that Meet Standards with Alternative Management Plan Corresponding to Technical Plans

Technical and management planning should yield a series of technical plans for which an alternative management plan to implement the technical plan has been presented. At this step, the alternative technical plans should be simply combined.

For each alternative technical and management plan that is combined into an alternative State WQM Plan, sufficient detail concerning the schedule of actions to be undertaken should be provided to enable accurate evaluation of the plan in terms of meeting 1983 water quality goals.

## B. Compile Information on Alternative Plans

The following information on the plans should be assembled for comparison of alternatives:

1. Contribution to Water Quality and Other Related Water Management Goals of the Area (Information from Chapters 5-8);

2. Technical Reliability (Information from Chapters 7-8);

3. Monetary Costs (Information from Chapters 7-8; methodology for cost evaluation provided in Chapter 11);

4. Environmental Effects (Information from Chapters 7-8, methodology for environmental evaluation provided in Chapter 13);

5. Economic and Social Effects (Methodology for evaluation of economic and social effects provided in Chapter 13);

6. Implementation Feasibility (Information from Chapters 9 and 10);

7. Public Acceptability (Guidance on means to assure public involvement in the planning process provided in Chapter 4).

Much of the above information will have been developed in the planning process; that which has not should be compiled in order to be able to proceed to final plan selection. Information may be conveniently assembled on tables like those presented in Chapter 14.

The format and procedures provided in Chapter 13 for compiling information on alternative plans is specifically designed to fulfill the need for the applicant to prepare an environmental assessment on the plan. Chapter 14 provides optional guidance on plan evaluation and selection.

## C. Compare Alternative Plans and Select Final Plan

### 1. Effects of Alternative Plans

Comparison of alternatives and selection of a final plan should be the product of public deliberation over the merits of the various plans under consideration. A discussion of means to involve the public in the overall planning process is provided in Chapter 4. Suggested procedures for public involvement in selection of the final plan are provided in Chapter 14.

2. Vary Alternatives if Necessary for Final Selection

To achieve the most desirable overall plan, a variant or composite of plans originally proposed could be considered.

3. Prepare Environmental Assessment of Plan: Environmental, Social, Economic Impact -- Element (p)

Chapter 13 provides guidance on impact assessment. This guidance should be followed to complete the requirements of element (p) of a State WQM Plan.

### D. Develop Detailed Description of Plan Features

In the process of screening, evaluating, and selecting plans, features of the plan may not have been developed in sufficient detail. At this step, the timing and detail of the plan should be finalized. A critical path chart may be a useful format for depicting the sequencing of plan implementation.

### E. Include Provisions for Performance Assessment, Plan Revision, and Updating

The plan, which covers a 20-year period, should be updated as necessary, and must be certified annually by the governor. Procedures for performance assessment and updating both technical and management features of the plan are to be specified in the initial plan submittal.

## 3.9 Plan Outputs

The major elements of a State WQM Plan are presented in Table 3.1 (p.3-56 ff.) along with the criteria for meeting the requirements of the regulation. These criteria may be used by the States and EPA in their reviews to determine if the State WQM Plans conform with the requirements of the Act, regulations, and the continuing planning process.

In addition to the elements in Table 3.1, the plan should include provisions for performance assessment, plan revision, and updating. These provisions should describe procedures for assessing progress of plan implementation, for modifying specific plan elements, for developing certain elements in more detail, and where possible, provide alternatives in the event that an original course of action proves infeasible or inadvisable in light of changed conditions.

## 3.10 Plan Adoption, Approval, and Revision

The following chart (Table 3.4) depicts the sequence of plan adoption, approval, and revision for plans developed by designated areawide planning agencies as well as by State agencies. These steps correspond to the requirements of Part 131.20-22. These procedures are generally self explanatory in the regulations. However, further clarification of the criteria for State certification of plans for designated areas and EPA approval of State WQM Plans is presented in this section.

### A. Review and Certification of Plans for Designated Areawide Planning Areas (§131.20(f))

Designated areawide planning agencies may submit all or parts of the State WQM Plan developed for the designated area for review and certification by the State. (In the case of interstate areas, designated area plans should first be submitted to the State encompassing the majority of the designated area population). Annual review and certification of such plans is also required pursuant to §131.22. States should review and certify plans developed by designated areas according to the following criteria:

#### 1. Requirements of Part 130 and 131 (§131.20(f)(1)(i))

The criteria by which the State reviews the parts of the State WQM Plan developed by designated areawide agencies should be the same as the criteria applied in the EPA review of the State WQM Plan as a whole: the plans or parts thereof should conform to the requirements of the Act and approved planning process, and contain the plan elements stated in Part 131. Where grants have been made to areawide agencies under the interim grant regulations (40 CFR Part 35, Subpart F), the plans or portions thereof should meet the requirements of the interim grant regulations and approved work plans. Nevertheless, all plans developed for areawide planning areas should be consistent with the State WQM Plan according to the criteria presented below.

#### 2. Water Quality Control Needs (§131.20(f)(1)(ii))

In addition to the overall review criteria of meeting the Part 130 and 131 requirements, the State should ascertain whether the plans or parts thereof, are consistent with other plan elements developed for the area by the State or in cooperation with the State. In particular, the State should ensure that the plans or parts thereof, meet the adopted State water quality standards and are consistent with approved maximum allowable daily loads of pollutants and point source waste load allocations.

## Table 3.4 Plan Adoption, Approval, and Revision Procedures

A. **Plan Review and Certification (for portions of a State WQM Plan Developed by Designated Areawide Planning Agencies)**

1. Plan Developed and Public Participation Completed (§131.20(a))
2. Plan Submitted to Elected Officials and Governor for Review and Recommendation (§131.20(b))
3. Comments by Governor; Comments by Elected Officials -- Within 30 days (§131.20(b))
4. Plan submitted to Regional Administrator for Comment -- Optional (§131.20(d))
5. Plan Formally Submitted to Governor (§131.20(e))
6. Plan Reviewed, Certified, Conditionally Certified or not Certified by the Governor (§131.20(f)), (g))

A. **Plan Review and Certification (for portions of a State WQM Plan Developed by a State Agency)**

1. Plan Developed and Public Participation Completed (§131.20(a))
2. Plan Submitted to Local Elected Officials for Comment (§131.20(c))
3. Plan Submitted to Regional Administrator for Comment -- Optional (§131.20(d))

B. **Plan Adoption**

1. Plan Adopted by the State (§131.20(h))

C. **Plan Submission**

1. Final Plans Submitted to Regional Administrator -- no later than Nov. 1, 1978 (§131.20(i))
2. Portions of Plans (Interim Outputs) Submitted -- according to above procedure at any time during development of plans (§131.20(j))

D. **Plan Approval**

1. Plans Approved, Conditionally Approved, or Disapproved by Regional Administrator -- Within 120 days of submission (§131.21(a),(b),(c))

E. **Plan Review and Revision**

1. State or Designated Area Reviews, Revises Plans (if necessary) Annually (§131.22(a))
2. Minor Plan Revisions Submitted to Regional Administrator -- through State in the Case of Designated Areas (§131.22(b))
3. Plan Revisions Resulting from Determinations of the Administrator or State (§131.22(c))
4. Substantive Revisions Submitted to Regional Administrator -- According to Original Review, Certification, Submission, and Approval Procedures (§131.22(d))

### 3. Consistency with Existing Law; Recommendation for Change of Existing Law (§131.20(f)(1)(iii))

The State should also determine whether implementation of the plan would be consistent with existing State and local laws regarding land use and environmental protection, or whether implementation of the plan would require changes in such laws. The State should determine how to resolve conflicts between recommendations of the plan and existing State and local law, and in adopting the plan accept, reject, or modifying the proposed solutions to such conflicts.

### 4. Basis for Selecting Management Agencies (§131.20(f)(1)(iv))

Finally, the State should determine whether the plan includes adequate recommendations concerning the agencies that the Governor could select to implement each provision of the plan. For each aspect of the plan it is necessary to have a management agency or agencies capable of implementing that portion of the plan. Each management agency must be capable of meeting the applicable requirements of §131.11(o). The determination of the applicable requirements will be based on an agency's assigned responsibilities under the plan. For example, an agency responsible for implementing parts of the regulatory program would not necessarily have to have authority to build waste treatment facilities.

### 5. State Adoption of the Plan (§131.20(f)(1)(v))

The State should either certify that the plan or parts thereof will be incorporated as the official State WQM Plan (or element thereof) for the appropriate planning area or if the plan is deficient, determine the specific changes and schedule for such changes to be made by the designated agency in order to receive State certification.

Table 3.1

| 40 C. F. R. Part 131 | Criteria for Meeting Requirements |
|---|---|
| (a) *Planning boundaries.* A delineation, on a map of appropriate scale, of the following: (1) The approved State planning areas included in the State planning process submitted and approved pursuant to § 130.41 of this Chapter and areawide planning areas designated pursuant to § 130.13 of this Chapter.<br>(2) Those areas in which facilities planning has been deemed necessary by the State pursuant to § 35.917-2 of this Chapter.<br>(3) The location of each water quality and effluent limitation segment identified in § 131.11(b)(2).<br>(4) The location of each significant discharger identified in § 131.11(c).<br>(5) The location of fixed monitoring stations.<br>(NOTE: Such monitoring station locations may be omitted if such locations are available in the EPA water quality information system). | (a) Self-explanatory |
| (b) *Water quality assessment and segment classifications.* (1) An assessment of existing and potential water quality problems within the approved planning area or designated areawide planning area, including an identification of the types and degree of problems and the sources of pollutants (both point and nonpoint sources) contributing to the problems. The results of this assessment should be reflected in the State's report required under Section 305(b) of the Act.<br>(2) The classification of each segment as either water quality or effluent limitation as defined in § 130.2(o) of this Chapter.<br>(i) Segments shall include the surrounding land areas that contribute or may contribute to alterations in the physical, chemical, or biological characteristics of the surface waters.<br>(ii) Water quality problems generally shall be described in terms of existing or potential violations of water quality standards.<br>(iii) Each water quality segment classification shall include the specific water quality parameters requiring consideration in the total maximum daily load allocation process.<br>(iv) In the segment classification process, upstream sources that contribute or may contribute to such alterations should be considered when identifying boundaries of each segment.<br>(v) The classification of segments shall be based on measurements of instream water quality, where available. | (b) Self-explanatory |

Table 3.1

| 40 C. F. R. Part 131 | Criteria for Meeting Requirements |
|---|---|
| (c) *Inventories and projections.* (1) An inventory of municipal and industrial sources of pollutants and a ranking of municipal sources which shall be used by the State in the development of the annual State strategy described in § 130.20 of this Chapter and the "project priority list" described in § 35.915(c) of this Chapter. The inventory shall include a description, by parameter, of the major waste discharge characteristics of each significant discharger of pollutants based on data from the National Pollutant Discharge Elimination System and the associated compliance monitoring systems, whenever available. | (c)<br>(1) The inventories of municipal and industrial sources should include all such sources contained in the planning area. Municipal sources should be ranked consistent with the most current State ranking system as approved by the EPA Regional Office. The industrial sources inventory need not be prioritized, but should include all such sources subject to NPDES permit issuance.<br>Analysis (and/or summary) of significant sources should include information on:<br>-- flow of discharge<br>-- all major discharge waste characteristics including all parameters which are limited by an NPDES permit or which cause a violation of Water Quality Standards<br>-- Numerical permit restrictions given in terms of concentrations or mass per unit of time<br>-- Stringency of effluent limitations related to BPT, BAT, or meeting Water Quality Standards<br>-- Final date for compliance with applicable effluent limitations |
| (2) A summary of existing land use patterns. | (2) Show land use patterns at a level of detail appropriate for design of pollution abatement strategies; as a guide the following size units of land should be classified according to land use:<br>-- 40-160 acre parcels in developed and developing areas (for purposes of facilities planning); these parcels should be on a map of suitable scale such as 1"=2000'<br>-- 640 acre parcels or larger in undeveloped areas with a scale appropriate for evaluating runoff problems (e.g. soils maps) |
| (3) Demographic and economic growth projections for at least a 20-year planning period disaggregated to the level of detail necessary to identify potential water quality problems. | (3) -- Show how demographic and economic projections relate to OBERS Series E projections;<br>-- show consistency with projections used in State air quality plans<br>-- show how projections are disaggregated to each planning area and within planning areas. |
| (4) Projected municipal and industrial wasteloads based on § 131.11(c) (1) and (3). | (4) Show how wasteload factors have been developed. |
| (5) Projected land use patterns based on § 131.11(c) (2) and (3). | (5) Show projected land use patterns based on (c)(2) and (3) and consistent with level of detail in (C)(2). Show how population growth shown in (C)(3) is allocated to land uses in (C)(5). |

Table 3.1

| 40 C. F. R. Part 131 | Criteria for Meeting Requirements |
|---|---|
| (d) *Nonpoint source assessment.* An assessment of water quality problems caused by nonpoint sources of pollutants.<br>(1) The assessment shall include a description of the type of problem, an identification of the waters affected (by segment or other appropriate planning area), an evaluation of the seriousness of the effects on those waters, and an identification of nonpoint sources (by category as defined in § 131.11(j)) contributing to the problem.<br>(2) Any nonpoint sources of pollutants originating outside a segment which materially affect water quality within the segment shall be considered.<br>(3) The results of this assessment should be reflected in the States' report required under Section 305(b) of the Act. | (d)<br>Include nonpoint source assessment in water quality assessment required under (b) |
| (e) *Water quality standards.* The applicable water quality standards, including the Statewide antidegradation policy, established pursuant to Section 303(a), (b), and (c) of the Act and any plans for the revision of such water quality standards. | (e) Self-explanatory |
| (f) *Total maximum daily loads.* (1) For each water quality segment, or appropriate portion thereof, the total allowable maximum daily load of relevant pollutants during critical flow conditions for each specific water quality criterion being violated or expected to be violated.<br>(i) Such total maximum daily loads shall be established at levels necessary to achieve compliance with applicable water quality standards.<br>(ii) Such loads shall take into account:<br>(A) Provision for seasonal variation; and<br>(B) Provision of a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality.<br>(2) For each water quality segment where thermal water quality criteria are being violated or expected to be violated, the total daily thermal load during critical flow conditions allowable in each segment.<br>(i) Such loads shall be established at a level necessary to assure the protection and propagation of a balanced, indigenous population of fish, shellfish, and wildlife.<br>(ii) Such loans shall take into account:<br>(A) Normal water temperature;<br>(B) Flow rates;<br>(C) Seasonal variations;<br>(D) Existing sources of heat input; and<br>(E) The dissipative capacity of the waters within the identified segment. | (f)<br>(1) Specification of flow conditions under which maximum daily load is calculated.<br>(i) Demonstration that the selected maximum daily load for each water quality segment and each parameter is consistent with meeting the water quality standard (this may require use of an analytic model).<br>(ii) . Show the relationship between seasonal variation and the choice of the design flow conditions.<br>. Show the rationale used in determining the margin of safety<br>(2) Same criteria as (f)(1) above. |

Table 3.1

| 40 C. F. R. Part 131 | Criteria for Meeting Requirements |
|---|---|
| (iii) Each estimate shall include an estimate of the maximum heat input that can be made into the waters of each segment where temperature is one of the criteria being violated or expected to be violated and shall include a margin of safety which takes into account lack of knowledge concerning the development of thermal water quality criteria for protection and propagation of fish, shellfish and wildlife in the waters of the identified segments.<br>(3) For each water quality segment, a total allocation for point sources of pollutants and a gross allotment for nonpoint sources of pollutants.<br>(i) A specific allowance for growth shall be included in the allocation for point sources and the gross allotment for nonpoint sources.<br>(ii) The total of the allocation for point sources and the gross allotment for nonpoint sources shall not exceed the total maximum daily load.<br>(4) Where predictive mathematical models are used in the determination of total maximum daily loads, an identification and brief description of the model, and the specific use of the model.<br>(Note: Total maximum daily loads shall not be determined by designated areawide planning agencies except where the State has delegated such responsibility to the designated agency. In those cases where the responsibility has not been delegated, the State shall determine total maximum daily loads for the designated areawide planning area).<br>(5) No point source load allocation developed pursuant to this section shall be less stringent than effluent limitations standards, or prohibitions required to be established pursuant to Sections 301, 302, 304, 306, 307, 311, and 316 of the Act. | (3) Show how the allotment for growth reflects anticipated economic and demographic growth over a five-year period, consistent with projections developed under (c).<br>(4) self-explanatory<br>(5) self-explanatory |
| (g) *Point source load allocations.* (1) For each water quality segment, the individual load allocation for point sources of pollutants, including thermal load allocations, for the next five-year period of the plan.<br>(Note: In those segments where water quality standards are established at levels less stringent than necessary to achieve the 1983 water quality goals specified in Section 101(a)(2) of the Act, the Regional Administrator may request the State to provide appropriate information, such as wasteload allocation information which may be relevant in making water quality related effluent limitation determinations pursuant to Section 302 of the Act).<br>(2) The total of such pollutant load allocations or effluent limitations for all individual point sources in the water quality segment shall not exceed the total allocation for the five-year period for all point sources of pollutants for each segment determined pursuant to § 131.11 (f)(3). | (g)<br>(1) self-explanatory<br>(2) If the sum of the individual loads is greater than the allocation for the segment show analytically how standards would be met at each discharge point. |

Table 3.1

| 40 C. F. R. Part 131 | Criteria for Meeting Requirements |
|---|---|
| (3) Each pollutant load allocation established pursuant to this paragraph shall incorporate an allowance for anticipated economic and population growth over at least a five-year period and an additional allowance reflecting the precision and validity of the method used in determining such allowance.<br>(4) Establishment of pollutant load allocations shall be coordinated with the development of terms and conditions of permits under the National Pollutant Discharge Elimination System and with any hearings pursuant to Section 302 and 316(a) of the Act relating to a source discharging to or otherwise affecting the segment.<br>(NOTE: Point source load allocations shall not be determined by designated areawide planning agencies except where the State has delegated such responsibility to the designated agency. In those cases where the responsibility has not been delegated, the State shall determine point source load allocations for the designated areawide planning area). | (3) Show how the allotment for growth reflects anticipated economic and demographic growth over a five-year period, consistent with projections developed under (c).<br>(4) Show existing permit terms under (c) and proposed permit terms under (m). |
| (h) *Municipal waste treatment systems needs.* (1) The municipal wastewater collection and treatment system needs by 5-year increments, over at least a 20-year period including an analysis of alternative waste treatment systems, requirements for and general availability of land for waste treatment facilities and land treatment and disposal systems, total capital funding required for construction, and a program to provide the necessary financial arrangements for the development of such systems.<br>(2) The identification of municipal waste treatment systems needs shall take into consideration:<br>(i) Load reductions needed to be achieved by each waste treatment system in order to attain and maintain applicable water quality standards and effluent limitations.<br>(ii) Population or population equivalents to be served, including forecasted growth or decline of such population over at least a 20-year period following the scheduled date for installation of the needed facility.<br>(iii) The results of preliminary and completed planning conducted under Step I and Step II grants pursuant to Title II of the Act.<br>(NOTE: In the absence of the Title II planning described above, the State is expected to develop the necessary estimates and analyses required under § 131.11(h)(1)). | (h)<br>(1-2) For each facility, provide an analysis of how each major alternative for treatment (treatment and discharge, re-use, land application) has been considered; after choosing one of the above approaches show the following information regarding alternatives for meeting treatment needs:<br>-- service areas<br>-- flows to be treated, over 20 years by 5 year increments<br>-- wasteload reduction including pretreatment requirements and requirements for higher than base level control where needed to meet waste load allocation<br>-- type of treatment (physical, chemical, biological or combination thereof)<br>-- population to be served including relationship with population and land use projections shown in (c)<br>-- indications of any infiltration/inflow problems and possible corrective measures<br>-- preliminary identification of sludge disposal/utilization options<br>-- costs of treatment, infiltration/inflow correction and sludge utilization or disposal [based on available 201 or 208 plans, or preliminary cost estimates]<br>-- indication of proposed program for financing capital and operating costs of treatment<br>(3) Self-explanatory |

Table 3.1

| 40 C. F. R. Part 131 | Criteria for Meeting Requirements |
|---|---|
| (i) *Industrial waste treatment systems needs.* (1) The anticipated industrial point source wasteload reductions required to attain and maintain applicable water quality standards and effluent limitations for at least a 20-year planning period (in 5-year increments).<br>(2) Any alternative considerations for industrial sources connected to municipal systems should be reflected in the alternative considerations for such municipal watse treatment system. | (i)<br>(1) Show industrial flows as projected in (c) and needed load reduction to meet load allocations described in (g), for a 20 year period in 5 year increments<br>(2) As part of the information developed for (h), show relationship of industrial flows to amount of flow to be treated by municipal systems (if systems are interconnected); specify the cost recovery requirements that would apply to industrial users and the degree to which cost recovery would provide financing of treatment works |
| (j) *Nonpoint source control needs.* (1) For each category of nonpoint sources of pollutants to be considered in any specified area as established in the State/EPA agreement (see § 130.11 of this Chapter), an identification and evaluation of all measures necessary to produce the desired level of control through application of best management practices (recognizing that the application of best management practices may vary from area to area depending upon the extent of water quality problems).<br>(2) The evaluation shall include an assessment of nonpoint source control measures applied thus far, the period of time required to achieve the desired control (see § 131.11(m)), the proposed regulatory programs to achieve the controls (see § 131.11(n)), the management agencies needed to achieve the controls (see § 131.11(o)), and the costs by agency and activity, presented by 5-year increments, to achieve the desired controls, and a description of the proposed actions necessary to achieve such controls.<br>(3) The nonpoint source categories shall include: (i) Agriculturally related nonpoint sources of pollution including runoff from manure disposal areas, and from land used for livestock and crop production;<br>(ii) Silviculturally related nonpoint sources of pollution;<br>(iii) Mine-related sources of pollution including new, current and abandoned surface and underground mine runoff;<br>(iv) Construction activity related sources of pollution;<br>(v) Sources of pollution from disposal on land in wells or in subsurface excavations that affect ground and surface water quality;<br>(vi) Salt water intrustion into rivers, lakes, estuaries and groundwater resulting from reduction of fresh water flow from any cause, including irrigation, obstruction, groundwater extraction, and diversion; and | (j)<br>(1) For each nonpoint source category identified in (d) and each planning area or sub-area delineated in (a) show the following:<br>(2) . Alternatives and measures chosen for reducing pollutants from existing nonpoint sources to a level consistent with the gross allotment established for such sources<br>. Alternatives and measures chosen for new or potential nonpoint sources so as to maintain existing water quality<br>. For each alternative measure and chosen measure for reducing pollutant generation from existing or new nonpoint sources show:<br>-- period of time to carry out measure (also see m)<br>-- adequacy of regulatory program to implement measures (also see n)<br>-- agency(s) to supervise implementation (also see o)<br>-- costs of implementing controls (both public and private sector costs)<br>-- budget of agency to supervise implementation<br>(3) self-explanatory |

Table 3.1

| 40 C. F. R. Part 131 | Criteria for Meeting Requirements |
|---|---|
| (vii) Sources of pollution related to hydrologic modifications, including those caused by changes in the movement, flow, or circulation of any navigable waters or groundwaters due to construction and operation of dams, levees, channels, or flow diversion facilities.<br>(NOTE: Nonpoint source control needs need not be determined by designated areawide planning agencies where the Governor has determined pursuant to Section 208(b)(4) of the Act that the State will develop nonpoint source control requirements on a Statewide basis.) | |
| (k) *Residual waste control needs; land disposal needs.* (1) An identification of the necessary controls to be established over the disposition of residual wastes which could affect water quality and a description of the proposed actions necessary to achieve such controls.<br>(2) An identification of the necessary controls to be established over the disposal of pollutants on land or in subsurface excavations to protect ground and surface water quality and a description of the proposed actions necessary to achieve such controls.<br>(NOTE: Residual waste control needs need not be determined by designated areawide planning agencies where the Governor has determined pursuant to Section 208(b)(4) of the Act that the State will develop residual waste control requirements pursuant to Section 208(b)(2) (J) and (K) on a Statewide basis.) | (k)<br>(1) Provision for utilization or disposal of residual wastes from municipal, industrial and private facilities should be included in (h) and (i)<br>(2) Identification of all existing and proposed residual waste, and subsurface disposal sites in area. Identification of control measures needed to be implemented for existing residual waste, land, and subsurface disposal sites including abandoned sites. Identification of control measures to be implemented for new residual waste, land, and subsurface disposal sites, to regulate future increases in wasteloads from such sites. For each control measure above, identification of corresponding regulatory program to implement controls. Demonstration that the planning process includes an analysis of wasteloads generated from residual waste disposal sites. |
| (l) *Urban and industrial stormwater systems needs.* (1) An identification of the required improvements to existing urban and industrial stormwater systems, including combined sewer overflows, that are necessary to attain and maintain applicable water quality standards.<br>(2) An identification of the needed urban and industrial stormwater systems for areas not presently served over at least a 20-year planning period (in 5-year increments) that are necessary to attain and maintain applicable water quality standards, emphasizing appropriate land management and other nonstructual techniques for control of urban and industrial stormwater runoff.<br>(3) A cost estimate for the needs identified in (1) and (2) above, the reduction in capital construction costs brought about by nonstructural control measures, and any capital and annual operating costs of such facilities and practices. | (l)<br>(1) An analysis of the magnitude of existing and anticipated urban stormwater problems including those resulting from combined sewer overflows. A specification of measures to be undertaken either to better manage existing storm and combined sewer systems and prevent entry of pollutants to such systems, or to provide for storage and treatment of such runoff.<br>(2) Specification of performance criteria for new construction of urban stormwater systems, so as to minimize any stormwater problems (including a regulatory program to implement performance criteria).<br>(3) Estimation of the effect on capital construction costs brought about by nonstructural control measures. Cost for improvements to existing systems and for implementing performance criteria for new systems including:<br>-- public and private sector capital costs<br>-- operations and maintenance costs |

Table 3.1

| 40 C. F. R. Part 131 | Criteria for Meeting Requirements |
|---|---|
| (m) *Target abatement dates.* Target abatement dates or schedules of compliance for all significant dischargers, nonpoint source control measures, residual and land disposal controls, and stormwater system needs, including major interim and final completion dates, and requirements that are necessary to assure an adequate tracking of progress toward compliance. | (m)<br>For each category of sources identified under (b) indicate:<br>-- schedule of compliance with terms of NPDES permit<br>-- schedule to implement BMP for all nonpoint sources, stormwater systems and residual waste systems<br>-- include interim completion dates and proposed scheduling of regulatory actions |
| (n) *Regulatory programs.* (1) A description of existing State/local regulatory programs which are being or will be utilized to implement the State water quality management plan. The description shall include the regulatory approach to be employed, the statutory basis for the program, and relevant administrative and financial program aspects.<br>(2) A description of necessary additional State/local regulatory programs to be established in order to implement the State water quality management plan. The description shall include the proposed regulatory approach, the necessary legislation, and anticipated administrative and financial capabilities.<br>(3) The regulatory programs described in § 131.11(n) (1) and (2) should generally take full advantage of existing legislative authorities and administrative capabilities. However, such programs shall assure that:<br>(i) To the extent practicable, waste treatment management including point and nonpoint source management shall be on a Statewide and/or an areawide basis and provide for the control or abatement of all sources of pollution including inplace or accumulated deposits of pollutants;<br>(ii) The location, modification and construction of any facilities, activities, or substantive changes in use of the lands within the approved planning area, which might result in any new or deleterious discharge directly or indirectly into navigable waters are regulated; and<br>(iii) Any industrial or commercial wastes discharged into any publicly owned treatment works meet applicable pretreatment requirements. | (n)<br>(1-2) Demonstration that management agency(s) recommended to implement plan have authority and capability specified in §208(c)(2) to provide waste treatment management on an areawide basis. Demonstration that planning process has identified and evaluated all sources of pollution in the area and developed appropriate control alternatives for existing and potential forms of pollution, including waste load reduction levels consistent with meeting and maintaining water quality goals of Section 101(a)(2).<br>-- For each category of pollutant sources identified in the planning process (including nonpoint source categories in (d)), identification of corresponding controls included in the initial plan.<br>Demonstration that an adequate regulatory program for each category of pollutant sources identified in the planning process is included in the plan, by documenting:<br>-- conditions and situations in which regulation applies, including abatement requirements<br>-- timing of regulations, notice, and hearings<br>-- legal form of regulation e.g., activity permits, land use controls, zoning, building codes, licensing of pollutant generating activities, conservation plans, etc.<br>-- legal authority for regulation; adequacy of existing law or proposed new regulation<br>-- agencies responsible for implementing regulation, agency staffing and funding for programs<br>(3)(i-ii) Same documentation as (n)(1). Demonstration that, to the extent practicable, waste treatment management is on an areawide and/or Statewide basis.<br>(iii) Demonstration that pretreatment requirements of §307 of the Act will be met. Demonstration that implementation of §307 requirements and other requirements proposed in the plan will allow proper functioning of facilities proposed in (h)(1). |

Table 3.1

| 40 C. F. R. Part 131 | Criteria for Meeting Requirements |
|---|---|
| (o) *Management agencies.* (1) The identification of those agencies recommended for designation by the Governor pursuant to § 130.15 of this Chapter to carry out each of the provisions of the water quality management plan. The identification shall include those agencies necessary to construct, operate and maintain all treatment works identified in the plan and those agencies necessary to implement the regulatory programs described in § 131.11(n).<br>(2) Depending upon an agency's assigned responsibilities under the plan, the agency must have adequate authority and capability:<br>(i) To carry out its assigned portions of an approved State water quality management plan(s) (including the plans developed for areawide planning areas designated pursuant to Section 208(a)(2), (3), or (4) of the Act) developed under this part;<br>(ii) To effectively manage waste treatment works and related point and nonpoint source facilities and practices serving such area in conformance with the approved plan;<br>(iii) Directly or by contract, to design and construct new works, and to operate and maintain new and existing works as required by any approved water quality management plan developed under this part;<br>(iv) To accept and utilize grants or other funds from any source for waste treatment management or nonpoint source control purposes;<br>(v) To raise revenues, including the assessment of user charges;<br>(vi) To incur short and long term indebtedness;<br>(vii) To assure, in implementation of an approved water quality management plan, that each participating community pays its proportionate share of related costs;<br>(viii) To refuse to receive any wastes from a municipality or subdivision thereof, which does not comply with any provision of an approved water quality management plan applicable to such areas; and<br>(ix) To accept for treatment industrial wastes. | (o)<br>(1) For each planning area and for each category of sources identified in the plan, identify agency(s) responsible for construction, operation, and maintenance of treatment works, and for carrying out the regulatory programs specified in (n)<br>(2) For each requirement (o)(2)(i-ix) relating to authority of management agencies to carry out various functions indicate the source of authority, the specific legislation or regulation specifying how such authority may be exercised by the appropriate agency, and the budget authority to implement each element of the plan. |
| (p) *Environmental, social, economic impact.* An assessment of the environmental, social, and economic impact of carrying out the plan. | (p)<br>(1) Environmental assessment of the plan (either at the level of each planning area or portions of planning areas) including identification of<br>-- plan schedule<br>-- effectiveness in meeting water quality goals<br>-- direct costs<br>-- social, economic, environmental impact |

# CHAPTER 4

# PUBLIC PARTICIPATION

## 4.1 Introduction

### A. Need for Public Involvement

The success of a water quality plan depends on its acceptance by the public and in particular affected units of local government. It is important that the general public in the planning area be actively involved in plan development and that public participation in the implementation phase of the plan be encouraged. Due to the complexity of planning, it is necessary to provide a structured program of public involvement to assure adequate exchange of information and opinion between the public and the planning agency.

### B. Legal Requirements

Public particpation is an important element in any water quality planning effort. Section 101(e) of the Act states:

> Public participation in the development, revision, and enforcement of any regulation, standard, effluent limitation, plan or program established by the Administrator (of EPA) or any State under this Act shall be provided for, encouraged, and assisted by the Administrator and the States.

Parts 130 and 131 establish extensive citizen participation requirements. Citizen participation is mandated throughout the entire planning process. In addition, the Environmental Protection Agency has published regulations specifying the minimum guidelines for public participation in water pollution control efforts. These regulations (40 CFR 105), summarized below, require planning agencies to do the following (See 40 CFR 105 for complete requirements):

1. Provide technical information "at the earliest practicable times and at places easily accessible to interested or affected persons and organizations" and to assist the public in understanding and responding to water programs.

2. To have "standing arrangements for early consultation and the exchange of views with interested or affected persons and organizations on development or revision of plans, programs or other significant actions prior to decision-making."

3. To maintain a current list of interested persons and organizations to be notified, when appropriate or required by law, concerning agency hearings, rule-making, or other significant actions.

4. To develop procedures to insure that information and evidence concerning water programs, when submitted by citizens, will receive proper attention. In particular, public reporting of water pollution law violations is to be encouraged.

5. To provide "full and open information on legal proceedings under the Act" to the extent consistent with court requirements and to a degree that does not prejudice the conduct of litigation.

6. To provide opportunities for public hearings on proposed regulations where appropriate or required by law. Public hearings should be conducted whenever there is sufficient public interest in a matter. Whenever doubt arises concerning the degree of public interest, the question should be resolved in favor of a hearing, or, if necessary, by providing an alternate opportunity for public participation. EPA regulations on procedures for public hearings should be followed if state agency procedures are less stringent. (See 40 CFR 105.7 for guidelines concerning public hearings.)

The activities listed represent only the minimum steps that planning agencies should undertake to provide for public involvement. In many instances, however, there are alternative methods for accomplishing this public involvement. The rest of this chapter discusses ways to comply with these requirements through a variety of formal programs of public participation.

## 4.2 Public Participation Program Development

### A. Public Participation in Formulating the State Continuing Planning Process

Since the continuing planning process is the State's overall management and decision-making framework for water quality programs, it is important to design this process in such a way as to enable, encourage and assist public involvement. The State must seek public reaction on the design of this decision-making process before submitting the process for EPA approval. It is especially important to involve the interested public in developing the State/EPA Agreement on level of detail and timing for carrying out State WQM Plans, and to specify the public involvement program that will be followed in plan development in the State/EPA Agreement.

### B. Relationship with the State WQM Planning Process

A program for public involvement must be an integral part of the State WQM planning process and should outline the specific means for public participation at each step in the planning process. The planning process should be designed so progression from one stage to another cannot take place without certain well-defined inputs from the public.

## C. The Major Phases in the Planning Process

The planning process involves several general phases, although planners may define the specific tasks within the phases somewhat differently. The phases are important because they are the activities around which a program of public participation should be organized. The planning process will include the following phases.

### 1. Establishment of Goals and Objectives

During the first stage of plan development, the planning agency should establish channels of communication with the public. Citizen opinion should be sought on the following issues:

1. The identification of water quality problems and priorities for resolving these problems.

2. The relative importance of water quality goals in relation to other community goals.

3. The role that water quality management can or should play in achieving community goals.

4. The use of land use controls and a regional approach to waste treatment to protect water quality.

5. The use of land disposal and other innovative or controversial pollution control technologies.

### 2. Design of Alternatives

Since water quality planning is but one aspect of community planning, it is important, particularly in the design of alternatives, that the planning agency consider how community goals may conflict or be compatible with water pollution control alternatives.

Citizen views should be solicited on the compatibility of various water pollution control approaches (municipal and industrial source control, land use and land management control for point and nonpoint sources, and control of residual waste) with other community goals.

It is also necessary to solicit public reaction to possible management alternatives for implementing the plan. Compatibility of the management alternatives with the following kinds of planning and implementation agencies may be considered:

- comprehensive planning agencies;
- general purpose local governments;
- sewer districts;
- air quality control agencies;
- water quality control agencies;
- soil conservation districts;
- solid waste planning agencies;
- transportation planning agencies;
- economic development agencies;
- parks and recreation agencies.

### 3. Impact Assessment

Since the evaluation of certain aspects of the plan is largely subjective, it is important that those affected by and interested in the plan be involved in assessing its impact. Special efforts should be made to obtain the reaction of those individuals and institutions that would bear the responsibility for financing, construction, operations, monitoring, and enforcement. The public should also have the opportunity to request further study of plan impact.

### 4. Recommendation and Acceptance of the Final Plan

During this stage, the planning agency should consider such factors as the attainment of additional benefits from increased expenditures, or the minimization of undesirable social, economic, and environmental impacts. Public comment that accurately reflects community goals and preferences is therefore needed on plan impact.

At this stage, it is vital that elected officials who are responsible for local approval of the recommended plan are made aware of public comments and opinions. This is a major responsibility of the entire public participation program.

### 5. Plan Revision

Once a plan has been selected, the public should still have the opportunity to participate in any periodic updating of the plan. Information should be available continually to permit evaluation of progress made under the plan.

## D. Principles for Public Involvement

While there are no hard and fast rules for structuring a public involvement program, several general principles should be kept in mind:

1. The program should be an active program. Since the optimum degree of public involvement will usually not occur spontaneously, simply providing information to those who ask for it is not adequate. An active program is needed to seek out and encourage those who can provide useful inputs, as well as those who will be affected by the plan.

2. The program should include adequate provision for disseminating information to the public. One of the greatest inhibitors to active public involvement in planning programs is lack of readily available information. To preclude this from happening, all data and information available to planners must be easily accessible to the public. Depositories of documents and data should be clearly identified to the public, and should remain open for use by the public at times that are generally convenient to the average citizen. Assistance should be provided in locating specific documents or data retained in the depository, reproduction equipment should be available for use at a moderate cost. Mailing lists, newsletters, and other publications should also be used.

3. The program should be allocated adequate time and funding within the overall planning effort. Costs of the program should be included in the planning budget.

4. The planning agency should designate and identify to the public a person or persons to be directly responsible for the public involvement program.

5. Elected officials and representatives of state and federal agencies who must pass judgement on a plan should be involved in all significant planning decisions.

6. The program should be responsive to all interested citizens. Participation in planning should not be dominated by any one interest group or individual. This can best be done by including without exception in mailings, notifications, etc., all parties who express interest in the project or who have been involved in community issues related to water quality planning and management.

## 4.3 A Model Program for Public Involvement

The task of providing for public participation in the planning process is, ultimately, the job of matching specific participation activities with specific planning tasks. There are many ways in which this matching might occur, depending upon how agencies define their tasks in detail and which participation activities they choose to emphasize. The following table (pp. 4-7, 4-8), lists six categories of public participation activity which should accompany each major phase of the planning process and matches them with one suggested definition of planning tasks. Within each category of participation activity will be found one, or several, suggested alternatives for that activity.

One useful method by which planning agencies can assure compliance with the public participation guidelines is to match the public participation items in the table with their own definition of planning tasks. Those responsible for assuring compliance can then "check" a participation activity as it occurs and be sure, finally, that for each major planning task all the major participation activities have been assured.

## 4.4 Institutional Alternatives for Representation of the General Public

Institutional arrangements to implement requirements for public participation are a matter of discretion, as long as the provisions made meet the criteria of the Act and Federal regulations. However, those arrangements chosen should:

1. Provide clearly defined channels through which citizens may contact decision-makers and planning staff.

2. Define responsibility for actively carrying out public involvement activities.

3. Provide adequate funding for public participation throughout the planning process.

4. Be responsive to all interested citizens, but not dominated by any single interest group.

Although a number of institutional arrangements may meet these requirements, a formal mechanism to ensure full citizen understanding and approval of the plan will probably be necessary, given the scope and complexity of water quality problems.

## PUBLIC PARTICIPATION ACTIVITIES

| Continuing Planning Process; Development of State WQM Plans | Informational material and access to information | | | | | Public consultation and assistance | | | | | | Public notice and hearing | | | Enforcement | | Legal Proceedings | | | Rule-Making | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | News releases and newsletters | Data depositories | Copying facilities | Exhibits | Speeches | Workshops and seminars | Surveys | Advisory groups | Ad hoc committees | Task forces | Staff assistance | Mailing lists | Public hearings | Informal notice | Consideration of citizen views | App't of individual or agency to manage public participation | Public notice | Publication of final decisions | Public hearings | Full information when possible | Public hearings |
| A. Continuing Planning Process | | | | | | | | | | | | | | | | | | | | | |
| 1. Process Design | | | | | | | | | | | | | | | | | | | | | |
| 2. State /EPA Agreement | | | | | | | | | | | | | | | | | | | | | |
| B. State WQMP Process | | | | | | | | | | | | | | | | | | | | | |
| 1. Planning Boundaries | | | | | | | | | | | | | | | | | | | | | |
| 2. Water Quality Assessments and Segment Classification | | | | | | | | | | | | | | | | | | | | | |
| 3. Inventories and Projections | | | | | | | | | | | | | | | | | | | | | |
| 4. Nonpoint Source Assessment | | | | | | | | | | | | | | | | | | | | | |
| 5. Water Quality Standards | | | | | | | | | | | | | | | | | | | | | |
| 6. Total Maximum Daily Loads | | | | | | | | | | | | | | | | | | | | | |
| 7. Point Source Load Allocations | | | | | | | | | | | | | | | | | | | | | |
| 8. Municipal Facility Needs | | | | | | | | | | | | | | | | | | | | | |

PUBLIC PARTICIPATION ACTIVITIES

| PLANNING PROCESS | Informational material and access to information | | | | | Public consultation and assistance | | | | | | Public notice and hearing | | | Enforcement | | Legal Proceedings | | | Rule-Making | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | News releases and newsletters | Data depositories | Copying facilities | Exhibits | Speeches | Workshops and seminars | Surveys | Advisory groups | Ad hoc committees | Task forces | Staff assistance | Mailing lists | Public hearings | Informal notice | Consideration of citizen views | App't of individual or agency to manage public participation | Public notice | Publication of final decisions | Public hearings | Full information when possible | Public hearings |
| 9. Industrial Facilities Needs | | | | | | | | | | | | | | | | | | | | | |
| 10. Nonpoint Source Control Needs | | | | | | | | | | | | | | | | | | | | | |
| 11. Residual Waste Control Needs | | | | | | | | | | | | | | | | | | | | | |
| 12. Stormwater Needs | | | | | | | | | | | | | | | | | | | | | |
| 13. Target Abatement Dates | | | | | | | | | | | | | | | | | | | | | |
| 14. Regulatory Programs | | | | | | | | | | | | | | | | | | | | | |
| 15. Implementing and Operating Agencies | | | | | | | | | | | | | | | | | | | | | |
| 16. Environmental, Social, and Economic Impact | | | | | | | | | | | | | | | | | | | | | |
| 17. Plan Review and Approval | | | | | | | | | | | | | | | | | | | | | |

An exemplary arrangement would be a fully-funded public participation working group, acting in partnership with the planning staff and management agency(s). Funds should be made available to cover the cost of printing, announcements in the media, and other incidental expenses.

## 4.5 Program Evaluation

An important part of any public involvement program is a set of feedback mechanisms to continually monitor the success or failure of the program. If feedback indicates ongoing efforts are inadequate, adjustments should be made as soon as possible, so that the success of the program will not be jeopardized. In making an evaluation, information may be drawn from a variety of sources, including:

- nature of informal contacts initiated by the public;
- amount of interaction between the planners and the public;
- attendance at meetings and hearings;
- amount of related public-sponsored activity such as meetings, workshops, door-to-door campaigns, etc.;
- amount and nature of media coverage;
- formal surveys.

In addition to monitoring inputs received from the public participation program, an evaluation should also be made of the effect these inputs had on subsequent decision-making. An effective public participation program should be structured in such a way that the inputs received have an influence on later decisions. Otherwise, the program is inadequate, and steps should be taken to correct the deficiency.

## 4.6 Advisory Committee for Designated Areas

In compliance with Section 304(j) of P.L. 92-500, the Administrator of the Environmental Protection Agency has entered into an agreement with the Secretaries of the Departments of Agriculture, Army, and Interior. Notice of Final Agreements was published in the Federal Register, Vol. 38, No. 225, November 23, 1973.

As a result of this agreement, the designated area planning agency must create a policy advisory committee, with representatives of the Departments of Agriculture, Interior, and Army invited to participate. Each Department may or may not participate as it deems appropriate. This requirement provides for coordination of the programs authorized under other Federal laws with water quality planning.

Provisions should also be made for inclusion of representatives of the general public on the policy advisory committee. The membership may be further expanded as considered appropriate by EPA and the State. A special effort should be made to include representatives of agencies responsible for other environmental programs being conducted in the planning area.

The requirement for State policy advisory committees is fully discussed in Chapter 2.3.B.

In addition to Policy Advisory Committees, citizen advisory committees should be established. It is unlikely that adequate citizen input will be obtained solely through the Policy Advisory Committee. Citizens can provide valuable inputs throughout the planning process. Their participation should be actively encouraged.

# CHAPTER 5

## WATER QUALITY STANDARDS REVISION

Guidance on revising water quality standards is being prepared and will be made available as soon as it is completed.

# CHAPTER 6

# LAND USE CONSIDERATIONS

## 6.1 Introduction

### A. Purpose

The purpose of this chapter is to describe an optional procedure for developing alternative subplans or strategies for pollution abatement for entire planning areas. This procedure consists of breaking the planning area into a series of units corresponding to various land uses, and calculating the pollutant loading (from all sources) associated with the land use configuration. Alternative abatement measures can be devised by changing the mix of land uses and land management practices associated with such uses. This will also enable tradeoffs between structural solutions (e.g., treatment facilities) and nonstructural solutions (e.g., alternative land uses), thus increasing the flexibility in the choice of methods to achieve water quality standards. Analysis of abatement strategies on an areal basis provides a focal point for developing particular point and nonpoint source abatement measures for various land areas within the planning area.

The areal approach to development of abatement measures is also useful as a means of relating possible control strategies to other planning activities which can affect land use decisions. Since water quality is one of a series of economic, social, and environmental objectives which may be considered when making land use decisions, the planning agency should be fully aware of planning and implementation programs designed to achieve these and other objectives of the area. Of particular importance are planning efforts which may be ongoing during the development of the plan. This could include land use, coastal zone management, and air quality maintenance planning. The planning agency must work closely with agencies responsible for other planning and implementation programs to ensure that plans are compatible and that the implementation of other plans and programs does not have an adverse impact on carrying out the plan.

### B. Pertinent Authorizations

Section 201(c) authorizes, to the extent practicable, the "control or treatment of all point and nonpoint sources of pollution...." This implies a need for considering land use controls and land management practices as a means for nonpoint source control.

Section 208(b)(2)(C)(ii) provides that the areawide waste treatment management plan include "the establishment of a regulatory program to regulate the location, modification, and construction of any facilities within such area which may result in any discharge in such area...." This provides authority for the management agency(s) to regulate location of new pollutant dischargers by determining the location of municipal treatment facilities, by seeking control of other pollutant sources, and by seeking appropriate changes in land use plans and controls from the agencies possessing land use jurisdiction in the area. The term "facilities" in the above citation includes any controllable source of pollutants, the regulation of which contributes to attaining water quality standards.

More explicit authority for the plan to consider land use in the area is provided in Section 208(b)(2)(F-H) which states that the plan will set forth procedures and methods including "land use requirements" to control to the extent feasible certain nonpoint sources of pollution. The term "land use requirements" in Section 208(b)(2)(F-H) includes those land use controls (legally permitted uses) and those land management regulations (regulation of activities conducted on land) which contribute to the attainment of water quality standards.

## C. Relationship with Existing Land Use Plans

Throughout the process of incorporating land use considerations into the plan, primary reliance should be placed on utilizing existing land use plans, projections, and controls, although it will be necessary in some cases to identify necessary revisions to incorporate changes responsive to water quality objectives. Since it is unlikely that the planning agency will have the authority to enact or implement changes in land use controls, it is essential that the planning agency work closely with those government agencies possessing legal authority for land use planning and control. This will be necessary to assure that the management agency(s) has the authority to implement the plan.

It is also possible that some jurisdictions within the area will not have land use plans, projections, and/or controls. In this case, the planning agency should work with the appropriate jurisdictions to gather enough information about the area so that current and future development patterns, densities, and policies can be identified. If it is determined that revisions in these patterns, densities, and policies are necessary to achieve water quality standards in a cost-effective manner, the planning agency must work closely with the appropriate jurisdictions possessing legal authority to enact and implement such revisions.

The major output of the procedure describe in this chapter should be alternative abatement strategies or subplans for all pollutant sources, with particular attention given to land use and land management controls that could be used to implement these strategies.

## 6.2 Develop Area Subplans through Land Use Analysis

### A. Inputs

#### 1. Waste Load Projections by Land Area

Abatement strategies for land units within the planning area should be designed to reduce existing and projected waste loads in the area to an acceptable level. The population, employment, land use, and waste load projections developed as part of element (c) of the State WQM Plan should be used as the basis for developing the abatement strategies.

#### 2. Display of Waste Load Projections

In order to develop abatement strategies, it may prove useful, especially to elicit public reaction, to display existing and projected wasteloads to show their spacial configuration. This could be done on maps used to develop land use projections. Rather than using a single map, it might be appropriate to use a series of maps so that point sources, nonpoint sources, and various pollutant parameters can be clearly identified.

#### 3. Detailed Projection of Wasteloads

Where land use and wasteload projections developed for element (c) do not provide sufficient information to enable design of abatement alternatives, the following land use and environmental factors may be useful in developing a more detailed breakdown of wasteload information:

a. Topographic and soil series classifications;

b. Bodies of water and related lands that would be beneficially or adversely affected by a change in water quality;

c. Water supply, treatment, and distribution systems;

d. Existing waste treatment and collection systems, including interim facilities and major urban storm drainage facilities;

e. Solid waste disposal sites;

f. Areas presently served by septic tanks and areas suitable for septic tanks at specified densities;

g. Environmentally sensitive areas:

- Aquifers and aquifer recharge areas;
- Marshland and wetlands;
- Drainageways and stream buffers;
- Flood plains;
- Forests and woodlands;
- Erodable and/or poorly drained soils;
- Steep slopes;
- Shorelands.

However, before collecting additional land use and environmental information, it is important to understand how the information can be used to relate land use and environmental factors to water quality. (A discussion of wasteload estimation and prediction techniques is found in Chapters 7 and 8.)

## B. Develop Alternative Abatement Strategies

### 1. Analyze Alternative Land Use Controls and Practices

Land use controls and practices should be analyzed to determine those which would be most cost efficient in reducing pollutant loadings, based on the specific water quality problems in the area. For example, if sediment is a primary problem, special consideration should be given to controls such as grading regulations, construction ordinances, and sediment and soil erosion control ordinances.

Following is a list of major land use controls and practices that should be considered as possible measures for implementing pollution control in a planning area. Other ordinances, regulations, and policies which may have a direct or indirect impact on water quality should also be assessed:

- Zoning;
- Flood plain zoning and regulations;
- Environmental performance zoning;
- Subdivision regulations;
- Planned unit development regulations;
- Buffer zones;
- Conservation and scenic easements;
- Density bonuses;
- Housing codes;
- Building codes;
- Construction permits;
- Development permits;
- Transferable development rights;

- Hillside development regulations;
- Drainage regulations;
- Grading regulations;
- Soil erosion and sediment control ordinances;
- Solid waste control ordinances;
- Septic tank ordinances;
- Taxation policies;
- Public works policies;
- Public investment policies;
- Land conservation policies;
- Discharge permits.

Land use controls and practices should be reviewed and analyzed as early as possible in the planning process to ensure their feasibility in plan implementation especially with respect to nonpoint source control. When evaluating land use controls and practices for the area, the planning agency should be cognizant of the general authority and requirements for land use provided under state and local environmental, conservation, and land use planning programs. Additionally, the agency should survey existing State enabling laws relating to land use and identify necessary or desirable statutory changes. This will help ensure that the plan can be implemented with proper legal authority. Institutional structures for implementing the controls are discussed in Chapter 9.

Since land use controls and practices are used to achieve a variety of objectives, the following factors should be considered when conducting the analysis:

a. Implementation capability. Careful consideration should be given to the feasibility of land use controls and their relationship to existing and proposed institutional and financial arrangements.

b. Consistency with other programs. To the extent that it is practical, the land use controls should be consistent with other programs, policies, and plans such as those related to transportation, water supply, capital improvements, air quality, etc.

c. Public acceptance. Since controls that are unacceptable to the public are unlikely to be implemented, it is essential that serious consideration be given to the public's viewpoint. Appropriate public participation measures are discussed in Chapter 4.

### 2. Develop Alternative Subplans

Alternative subplans for all sources should be developed, based on the analysis of land use controls and practices and specific point and nonpoint source controls for each land unit considered in the analysis. Information on point and nonpoint source abatement techniques is found in Chapters 7 and 8.

### 3. Display Wasteloads for Subplan

The waste loadings for each subplan should be displayed to show their alternative spacial configuration. (This step completes the development of alternative area subplans (Chapter 3.6.E).) A list of the land use controls and practices needed to implement a given subplan should accompany the display. This list as well as the display can be used in the environmental assessment and plan selection process.

## C. Refine Subplans

After the various subplans have been developed, further refinements should be considered in screening alternative subplans and combining subplans into alternative areawide plans. The following questions may prove useful in suggesting some final refinements:

1. Is this the optimum development pattern for water quality?

2. Could the number and magnitude of discharges be reduced if the development pattern was changed?

3. Will the location of discharges have an adverse impact on water quality?

4. Will the timing of discharges have an adverse impact on water quality?

5. Would the implementation of additional land use controls reduce overall investments?

# CHAPTER 7

# NONPOINT SOURCE MANAGEMENT CONSIDERATIONS

## 7.1 Introduction

Chapter 3 presents a framework for the systematic evaluation of all sources of pollution and selection of alternative plans for the area. The control plans must identify nonpoint sources, evaluate their impact on water quality, and delineate measures for their control.

Nonpoint sources, while not defined in the Act, are, by inference, the accumulated pollutants in the stream, diffuse runoff, seepage, and percolation contributing to the degradation of the quality of surface and ground waters*. They include the natural sources (seeps, springs, etc.) and millions of small point sources that presently are not covered by effluent permits under the National Pollution Discharge Elimination System.

Provisions for control of nonpoint sources from agricultural, silvicultural, mining, construction and urban/suburban area must be included in the development of a State WQM Plan. Land and subsurface disposal of residual wastes, salt water intrusion, and hydrographic modification contributing to water quality degradation must also be considered.

## 7.2 Statutory Requirements and EPA Policy

### A. Statute

Section 208(b)(2)(c)(i) states that a 208 plan shall include establishment of a regulatory program to "implement the waste treatment management requirements of Sec. 201(c)," which calls for control of all point and nonpoint sources of pollution.

Section 208(b)(2)(F-I) states that a plan prepared under the areawide waste treatment management planning process shall include:

> "A process to (i) identify, if appropriate,...(nonpoint sources of pollution)..and (ii) set forth procedures and methods (including land use requirements) to control to the extent feasible such sources."

---

* This definition of nonpoint sources is for purposes of explaining how the States could develop Best Management Practices for all runoff sources of pollution not covered by the NPDES program. This definition is not intended to reflect EPA's possible response to the court order required by Judge Flannery's decision on NRDC v. Train, Civil Action No. 1629, Federal District Court for the District of Columbia.

Finally, Sections 208(b)(2)(J) and (K) provide that a plan shall include:

> "A process to control the disposition of all residual waste generated in such area which could affect water quality," and
>
> "A process to control disposal of pollutants on land or in subsurface excavations within such area to protect ground and surface water quality;"

## B. EPA Policy on Implementing the Statutory Requirements

The requirement for a regulatory program over all point and nonpoint sources places a clear responsibility on areas developing State WQM Plans to establish regulation of nonpoint sources. It is EPA policy that the type of regulation appropriate for each nonpoint source category should be established by the State. Designated 208 planning agencies may also define nonpoint source regulatory measures for approval by the State.

For each nonpoint source problem category, "Best Management Practices" (BMP) should be defined and implemented through appropriate regulation. The term "Best Management Practice" refers to a practice, or combination of practices, that is determined by a State (or designated areawide planning agency) after problem assessment, examination of alternative practices, and appropriate public participation to be the most effective, practicable (including technological, economic, and institutional considerations) means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals.

## C. General Criteria for Choosing BMP

The definition of BMP states several criteria or tests which should be applied by the State in choosing Best Management Practices (BMP):

- a BMP should manage "pollution generated by nonpoint sources"
- a BMP should achieve water quality "compatible with water quality goals"
- a BMP should be "most effective in preventing or reducing the amount of pollution generated"
- a BMP should be "practicable"

1. A BMP should manage "pollution generated by nonpoint sources"

Water pollution sources can be functionally categorized in accordance with man's activities. This type of categorization has been used in Sections 208 and 304(e), P.L. 92-500, in connection with nonpoint sources. It is considered to be applicable to the selection of BMP to prevent or reduce pollution from these sources. As a minimum, the State should consider the following activity categories in its establishment of BMP for nonpoint sources:

1. Agricultural Activities
2. Silvicultural Activities
3. Mining Activities
4. Construction Activities
5. Urban Runoff
6. Hydrologic Modifications
7. Sources Affecting Ground Water
8. Residual Wastes Disposal

The interrelation of the activities outlined above should be considered in the selection of BMP. It may be advantageous to further categorize the nonpoint sources based on similar control aspects. Utilization of sub-categorization could reduce the amount of duplication in the selection of BMP. Examples of such subcategorizations are: (1) by similar physical conditions, e.g., soils, slope, precipitation patterns; (2) by similar activities, e.g., soil disturbance -- construction, strip mining, land development; (3) by site-specific characteristics, e.g., all activities in a single area of like conditions; and (4) by pollutant to be controlled, e.g., sediments, acidity/alkalinity, oxygen demanding materials. Further guidance on establishing categories is found in Chapter 7.4.

2. A BMP should achieve water quality "compatible with water quality goals"

Through analysis of existing water quality data and of newly acquired data where necessary, target levels of abatement should be chosen for each planning area in the State. The BMP should be selected in terms of meeting these targets. The pollutants that must be controlled should be determined. While BMP will normally prevent or reduce several pollutants, the final selection of BMP should be related to those pollutants that must be controlled to achieve water quality goals.

### 3. A BMP should be "most effective in preventing or reducing the amount of pollution generated"

Through water quality analysis, the State should select abatement levels against which the effectiveness of the BMP can be related. These levels (lbs/tons per day/week/month/year, lbs/tons per acre/square mile/basin, etc.) should be related to the reduction of pollutants and achievement of water quality goals. The effectiveness of the BMP in reducing pollutants should be fully evaluated in terms of the selected abatement levels.

The reduction or elimination of pollutants in the runoff, seepage, and percolation from nonpoint sources can materially contribute to the protection of the quality of the Nation's waters. In general, there are two options for accomplishing the needed reductions and/or eliminations, namely; (1) collection and treatment of the pollutants and, (2) reduction and/or prevention of the formation, runoff, seepage, and percolation of the pollutants.

Collection and treatment of the runoff, seepage and percolation of pollutants from nonpoint sources may be necessary in some cases. However, the collection and treatment of pollutants from nonpoint sources is generally complex and expensive. Because of this, collection and treatment is considered to be a final measure to be utilized where other preventive measures will not reach the necessary water quality protection goals.

The BMP must be technically capable of preventing or reducing the runoff, seepage, or percolation of pollutants. First consideration should be given to those preventive techniques that have been shown to be effective during their past use. New and innovative techniques should be fully analyzed as to their technical capability of preventing or reducing pollutants prior to their consideration for incorporation into the BMP.

While one practice (measure) may be adequate in some cases, BMPs will generally consist of a combination of practices. The various alternatives should be fully evaluated. In choosing among the alternatives, the BMP that most effectively achieves the desired level of water pollution control should be chosen. If more than one alternative will achieve the level of effectiveness necessary to reach water quality goals, the least costly alternative should be chosen.

4. A BMP should be "practicable"

Implementation of the BMP should be feasible from not only the technical standpoint but also from the financial, legal, and institutional standpoint. The practicality of securing early implementation should be evaluated in the selection of the BMP.

The primary goal of BMPs is the protection of water quality However, expensive preventive techniques that will result in little water quality benefits should be avoided. The BMP must be capable of being implemented within the financial capability of the area, and of the owners or operators of the various sources. Side benefits as well as the installation and operational costs should be included in the evaluation. The final selection of the BMP should take into consideration both the costs of the preventive techniques and the economic benefits (water quality or otherwise) to society that will result from their use.

A number of the preventive techniques that may be incorporated in the BMP are already in wideapread use within various source categories. These techniques should receive first consideration in the selection of the BMP. Techniques that will require operational changes in the source management should be avoided unless they are necessary for water quality protection. Insofar as is possible, the initial implementation of the BMP should be accomplished with the existing legal and institutional framework of the State. However, if additional legal authority is needed, steps should be taken at an early date to secure the needed authority.

Full consideration should be given to the total effect on the environment in the selection of the BMP for water pollution control. A BMP applied to prevent or reduce water pollution should not result in adverse effects on the other portions of the environment such as the creation of air pollution or solid waste disposal problems. Adverse effects on other portions of the environment are not only undesirable but also will delay the implementation of a BMP to control water pollution.

## 7.3 Planning Methods for Selection of Best Management Practices

Best Management Practices should be related to water quality protection needs. In order to choose management practices, it is important to establish (1) how much of a water quality problem exists, (2) to what extent the problem is attributable to particular categories of nonpoint source generating activities, (3) how much reduction of pollution from these activities might be needed, (4) what it might cost to achieve such reduction, and (5) through what legal, financial, and institutional mechanisms the practices might be implemented. In order to answer these questions, it is helpful to investigate them in a systematic manner. The following guidance is designed to help answer these questions, based on the planning process framework established in Chapter 3.

## 7.4 Technical Planning

### A. Introduction

The purpose of this phase of nonpoint source planning is to answer the question of how much reduction of pollution is needed for particular nonpoint source activities in order to protect water quality, and establish the most cost-effective measure for accomplishing this. There are many conceivable approaches for relating nonpoint source control needs to water quality. The level of sophistication of planning should be chosen in the light of data availability and the need for analyses in order to make a reasonable argument that particular BMPs are needed and will accomplish their purpose. It should be recognized that relating in-stream water quality to levels of pollution generation from categories of nonpoint source activity is a difficult analysis. Nevertheless, this analysis should be carried out in order to provide the best information possible for establishing the needed level of abatement of various nonpoint sources. Once abatement levels are established for particular nonpoint source activities, it is possible to rely on existing information on costs and abatement effectiveness of alternative management practices.

## B. Inputs

### 1. Water Quality Analysis

The water quality analysis described in Chapter 3 should provide the following inputs to nonpoint source planning:

- assessment of nonpoint sources:

  The assessment should indicate whether in-stream problems exist related to runoff and what categories of runoff pollution are suspected of causing problems.

- segment classification:

  Planning for nonpoint sources is only required in relation to water quality needs. Thus nonpoint source planning should be undertaken in water quality limited segments, including segments classified as water quality limited as part of an anti-degradation policy.

- existing/projected wasteloads:

  Information on existing/projected loads from nonpoint sources* should be used in the process of classifying

---

* The nonpoint sources are the sources contributing to water quality degradation where that degradation cannot be accounted for by the known point sources. This applies from the largest basin to the smallest subbasin. The nonpoint source load can be expressed as follows:

$$N = (Q+S+D) - (P+I)$$

Where:

N = Quantity (mass) of nonpoint source pollutants in terms of a given parameter, under a given design flow condition
Q = Quantity of pollutants in the water leaving the test area
S = Quantity of settlement and precipitation of pollutants
D = Quantity of decay of nonconservative pollutants
P = Quantity of pollutants discharged by point sources (assumed to be constant under a given design flow condition)
I = Quantity of pollutants in the water entering the test area

segments. However, since information on existing nonpoint source loads is likely to be scanty, this information should be further developed in order to choose nonpoint source management practices.

- maximum allowable loads:

  In water quality limited segments, a gross allotment for each parameter of pollution should be made (under design flow conditions) for nonpoint sources. This allotment provides the basis for establishing pollution reduction levels for various nonpoint source categories.

## 2. Priorities

The level of detail of plan elements should be established early in the planning process. For plan elements which cannot be implemented in the next five years, an assessment can be undertaken (see Ch. 3.3.C). In the case of nonpoint sources a number of factors should be considered in determining whether controls can be implemented in the near future.

First, the water quality problem that the controls would seek to alleviate should be physically reversible. Problems of benthic deposits (classified as nonpoint sources) may or may not be easily reversible. Natural levels of siltation and stream bank erosion may not be controllable.

Second, to be controlled in the near future, the receiving water should have a potentially fast recovery rate. Examples might be impoundments or lakes exhibiting eutrophication due to nutrients from nonpoint sources or estuaries where shellfish production is limited by toxics or siltation from nonpoint sources.

Third, there should be public support for solving the particular problem. The prospects for public support are probably greatest where a particular problem impairs beneficial uses such as water supply, recreation, and fish and wildlife habitat. Public support also entails financial support for capital-intensive control measures. There should be a reasonable prospect of obtaining financial support for the measures; however, development of management practices should not be precluded by lack of specific sources of funding for such measures.

### 3. Designation of Planning Agencies

It is possible that many agencies will be involved in nonpoint source planning and implementation. These agencies should be identified in the State/EPA Agreement (§130.11). As explained in Chapter 2, it is advisable for one agency to develop the water quality analysis and constraints for particular areas of a State. However the responsibility for developing alternative abatement measures may be divided among many agencies. In order to make decisions concerning the divisions of planning and implementation responsibilities, it may be helpful to initiate management analysis (see Chapter 7.5) in order to identify agencies and levels of government having particular expertise in nonpoint source management.

## C. Approach for Relating Water Quality Constraints to Abatement Measures

### 1. Area Approach

As explained in Chapter 3, where there are complex interactions between activities that generate nonpoint sources and point sources, it may be appropriate to analyze the problems of particular land areas within a planning area, develop a mass balance for each of the pollutants, and attempt to choose the optimal level of abatement for all these sources. For example, this approach may be advisable where a number of sources contribute to a given problem - e.g., storm water and municipal treatment effluents contributing to high fecal coliform counts. The control needs for storm water should be chosen in conjunction with those for municipal plants. This might vary from one urban area to another. The problem may be very complex and the solutions potentially very costly. Careful analysis of the tradeoffs is warranted in establishing BMPs in such cases.

### 2. Category Approach

It is possible that particular pollution problems such as sediment are attributable to certain activities having well defined geographic boundaries. If the total problem can be quantified, it should be possible to divide the total into manageable parts and devise abatement measures for each part. For example, if the sediment problem can be sufficiently well identified so that an overall annual loading of sediment can be established for a basin, this level can be divided into a series of targets for particular activities through a variety of allocation techniques. This allows planning efforts to focus on particular problems one at a time. Another example of the category approach would be in the case of new or potential nonpoint source problems. Since they are difficult to quantify and predict, it is not feasible to establish tradeoffs between different new sources. Instead each activity could be planned for independently, with the goal of determining highest feasible abatement levels for each activity.

### a. Establish Planning Categories

Under either the area approach or the category approach, it is necessary to divide the nonpoint source problem into parts in order to devise management practices appropriate to each aspect of the problem. In general the following broad categories of nonpoint sources should be used in establishing BMPs:

- agricultural activities
- silvicultural activities
- mining activities
- construction activities
- urban runoff
- hydrologic modifications
- sources affecting groundwater
- residual waste disposal

#### 1) Existing and new sources

For each category of nonpoint sources in the area, an operational definition of new and existing sources should be established. A new source would be one that would cause a major change in drainage. A change from agricultural to residential use with a resulting significant change in runoff could be considered new. In addition, all new stormwater systems and hydrographic modification after a given date might be considered as "new". Normal changes in the conduct of a given activity such as agriculture should not be considered as creating a new source. Rather the distinction should be based on major changes in topography and drainage that would tend to cause significant increases in nonpoint source pollution. The purpose of the distinction between new and existing sources is twofold. First, greater depth of planning detail may be appropriate in determining management practices for existing sources, which vary greatly in their magnitude and controllability. Secondly, since it is not possible to anticipate the magnitude of future nonpoint source problems, the presumption should be that once existing sources adopt controls needed to protect water quality, new sources should be required to adopt the best practices available for preventing future increases in pollution. The best practices for new sources will in many cases prevent more pollution per dollar spent than best practices for existing sources, since there will be flexibility to prevent problems before they arise, rather than attempting to control them after the fact.

### 2) Factors Which Could be the Basis for Further Subcategorization

The following are some of the factors that could be used to distinguish subcategories of each existing and new nonpoint source category:

- physical conditions: e.g. soil, slope, rainfall, proximity to streams, underlying geologic structure, etc.
- activity: e.g. surface disturbance, subsurface disturbance, road construction, change in ground cover, etc.
- site specific conditions: e.g. a certain type of mining carried out in a particular geographic area

## b. Allocate Load Reductions to Each Category

### 1) Allocation Techniques

As discussed in Chapter 3, there are a number of ways of expressing the maximum allowable load of pollutants. The allowable load may be expressed in units of mass/unit time, where time refers to a particular wet weather flow condition. The load may also be expressed as mass/unit time where the time period is longer -- perhaps mass/year. The following are some possible approaches for allocating this load to the eight general categories of nonpoint sources discussed previously:

Option 1.1 - proportional to area occupied by category:

Under this approach, each major nonpoint source category would be allocated a permissable load in proportion to the area it occupied. This approach would result in the same loading constraint per acre for all categories. This would be exceedingly difficult for the categories that generate relatively large quantities of pollutants per unit area to meet.

Option 1.2 - proportional to area, with tolerance levels for each category:

This approach would involve assigning each category a base allowance of pollutant loading per acre according to the uncontrollable or background loading expected from each category. The remaining amount of the maximum load could be assigned in proportion to area occupied by the category. This approach has the merit of recognizing realistic limits of load reduction for each category.

Option 2.1 - equal relative reduction:

Rather than develop a mass per acre constraint for each category, the information used in determining the maximum allowable load could provide an indication of the relative reduction from the existing loading needed to meet the standards. For example if the existing loading were twice the loading that should be allowed, the relative reduction for all sources should be 50% of whatever amount of pollution each source or category of sources was causing. This approach would treat all polluters as equally responsible for the cleanup burden whether their per acre contribution was large or small.

Option 2.2 - equal relative reduction, with tolerance level for each category:

By this approach each category would be allowed a given load per acre based on background or uncontrollable factors. An equal relative reduction of the excess over the allowed amount could be applied to all polluters. The relative reduction would be based on the aggregate reduction needed for the entire segment or basin.

Option 3.1 - best technology:

This approach involves defining the load constraint for each category on the basis of the abatement efficiency of the best techniques for abating pollution for each source category. These abatement levels can be expressed in units of mass/acre/time converted to units of mass/time in order to determine whether the sum of the loads for all categories would be compatible with the maximum allowable load. Based on the comparison between the abatement achievable with best techniques and the allowable load, adjustments in the load constraint for each category might be necessary.

To the extent that the allowable load would be assigned to existing sources, with little or no allowance for pollution from new sources, it would be necessary to establish loading constraints for new sources on the basis of best technology.

These allocation approaches could be used to divide the burden of meeting the maximum allowable load among the principal nonpoint source categories. Within the eight categories mentioned, there are many possible subcategories representing different natural physical conditions and production activities. The allocation for the eight categories could be further divided into the subcategories.

### c. Relationship Between Generation of Pollutants and Transport to Receiving Waters

The portion of the allowable load assigned to each nonpoint source category is the loading that would be generated by sources in that category and transmitted to receiving waters. Since part of the load that is generated may be assimilated on the land as it flows over or through land to the receiving water, the load constraints referred to above apply to the combined generation and transmission of a pollutant. If the constraint is 10 TN/acre/yr at the receiving waters and the rate of generation at the source is reduced to 20 TN/acre/yr, with a transmission rate of 50% of the amount generated at the site, the receiving water constraints can be met.

### d. Relationship Between Pollutant Parameters

In order to simplify the process of establishing the management practices to meet the load constraints for each pollutant and for each category, it may be possible to focus on one or more pollutant parameters as the principal constraints to be met. For example, in rural areas, the chemical analysis of sediment may be fairly uniform over large areas. Thus if appropriate controls are determined for sediment, these controls will also have a predictable effectiveness in reducing BOD, pesticides, phosphorus, and other pollutants that are associated with sediment. In urban areas the relative proportion of sediment and other parameters may also exhibit certain uniformities.

## D. Develop Abatement Subplans

### 1. Area Approach

Procedures for developing abatement measures for each part of the planning area, for all pollutant sources are discussed in Chapter 6. Procedures for developing alternative controls for each category are analogous to those described below in regard to the category approach.

### 2. Category Approach

The following steps could be followed in order to determine how to meet the abatement levels established for each nonpoint source category. These same steps could also be followed in the area approach to predict the costs and effectiveness of alternative abatement measures for all nonpoint source categories within each part of the planning area.

#### a. Estimate Existing Waste Loads for each Category/Subcategory

Once the total nonpoint source load of a given pollutant under given flow conditions has been established, it is necessary to evaluate the breakdown of sources of this pollutant load.

The runoff, seepage, and percolation of pollutants from nonpoint sources is highly dependent on climatic, seasonal, and other variable events. High rainfall, antecedent rainfalls, cropping patterns, street sweeping schedules, time of travel of runoff, scouring and re-entry of pollutants, etc., must be considered in the evaluation. While average conditions shed light on the general situation, an analysis based on high and/or low runoff periods, covering specific climatic events and seasonal periods, is more likely to provide an accurate evaluation of the significance of each nonpoint source.

Data from sources such as building inspection offices, soil and water conservation districts, and planning agencies, should be evaluated to locate many of the potential nonpoint sources of pollutants. Soil survey maps, construction records, urban sanitation records, and other such documents can provide much information for evaluation of the pollution potential from nonpoint sources. A number of agencies (USGS, water treatment plants, health units, etc.) maintain water quality records, which should provide information on the origin of nonpoint sources.

In general, there are two approaches for tracing the origin of nonpoint source loadings:

- generalized prediction and,
- monitoring and sampling.

Whichever approach or combination of approaches is used, the objective should be to determine a reliable estimate of the load from each category of sources*.

In general, sampling and monitoring may be needed where problems are so site-specific that prediction techniques cannot be used with confidence; otherwise prediction techniques may be preferable, especially those that can be applied using existing information. However, analysis of nonpoint source loading should only be carried out to the level of detail needed to choose best management practices.

### 1) Prediction of Nonpoint Source Loads

Because monitoring and sampling for nonpoint source detection is costly and requires a long time period to construct an accurate set of data, it is advantageous to use nonpoint source load prediction techniques. Although estimating the pollution generated from nonpoint sources is a difficult task, there are prediction techniques which can be used. These techniques enable prediction of nonpoint source load generation and transport based on such measurable watershed parameters as soil, slope, vegetative cover, land use, size of drainage area, etc. While these techniques vary in their reliability, especially with regard to soluble pollutants and pollutants subject to breakdown in the environment, they can be useful in choosing best management practices.

---

* The sum of the loads from each category should enable construction of a materials balance showing loading for each pollutant to the stream and origin (location of each category of sources) of the loads. A materials balance should be constructed in order to carry out the area approach as described in Chapter 6. The materials balance can be broken down to whatever degree of detail is appropriate, depending on the accuracy of the method for estimating nonpoint source loading.

Guidance on the applicability of these models and the services available from federal agencies for utilizing the models is discussed in:

U.S. Environmental Protection Agency. Methods for Identifying and Evaluating the Nature and Extent of Nonpoint Sources of Pollution, Report No. EPA 430/9-73-014. Washington, D.C. 1973. GPO, $2.45.

U.S. Environmental Protection Agency, Interim Report on Loading Functions for Assessment of Water Pollution from Nonpoint Sources, November 1975, Project 68-01-2293. Available from Water Planning Division (WH-554), EPA.

U.S. Environmental Protection Agency. Control of Water Pollution from Cropland, 1975, Report No. EPA-600-2-75-026A. Available from Water Planning Division (WH-554), EPA.

Additional guidance on prediction models and technqiues for nonpoint sources is being developed by EPA and will be available in subsequent guidance.

### 2) Monitoring and Sampling to Identify Nonpoint Source Loads

Monitoring and sampling should be undertaken in the short term to identify nonpoint source loading in situations where more accurate estimates are needed than can be obtained through use of predictive models. Secondly, monitoring and sampling should be undertaken over a longer term to refine information on nonpoint source loading and to serve as a management device for assessing the progress made in attaining and maintaining water quality through implementation of best management practices.

In the short term, monitoring may be undertaken, if necessary, to estimate a single gross allotment (target abatement level) for all nonpoint sources contributing to a given water quality segment. Also, monitoring of carefully selected nonpoint sources may be undertaken as necessary to calibrate/verify the analytical technique chosen to estimate the nature and relative magnitude of the loads associated with each nonpoint source category. In particular, monitoring may be needed to verify or supplement loading estimates for such sources as stormwater outfalls, waste lagoons, septic seepage areas, land fills, spray irrigation areas, and other significant sources that are difficult to estimate through predictive techniques.

Since it is not expected that nonpoint source load estimates can be verified in the relatively short timeframe of initial plan formulation, it may be desirable to initiate an ongoing monitoring program to be carried out in the plan implementation phase.

The monitoring and sampling approach needed for nonpoint source identification and verification should determine a schedule of prioritized activities that will enable a given degree of identification of individual nonpoint sources at a given point. For example, if the total nonpoint source load to the area is 1/3 of the total pollutant load for a given pollutant, the monitoring and sampling activities should be aimed at verifying a given percent of the nonpoint source load by a given date. Instream water quality data which could be related to specific nonpoint source sites should be evaluated in order to determine whether a given increment of waste detectable in the stream could be attributed to a given nonpoint source.

The sum of the wasteloads that could be traced back to contributing sources should be a given percent of the total nonpoint source load that is chosen for the initial monitoring and sampling coverage. If the individual nonpoint sources that can be identified do not sum up to that given percent of the total nonpoint source load, then additional data should be collected.

### b. Assess Effectiveness and Costs of Alternative Management Practices for each Category

No single control method or set of control methods will be appropriate for all types of nonpoint source problems. Even controls for a particular type of source will vary in effectiveness according to geographic location. The controls should be tailored to local conditions if they are to be effective. Thus, a thorough knowledge of both specific types of nonpoint sources and local conditions is a prerequisite to the design of appropriate and effective controls.

The second step in determining best management practices for nonpoint sources is the identification of the technically feasible structural controls and the practicable nonstructural controls that are available for particular nonpoint source problems. Technically feasible control alternatives for particular types of nonpoint sources are categorized and discussed in the Best Management Practice papers, attached to these guidelines as Supplement No. 1. It should be emphasized that these control alternatives are cited only as examples, and that other viable alternatives, if available, should also be investigated and considered.

For each nonpoint source category causing a water quality problem, technically feasible control options should be presented. For each option, the cost of the control and the effectiveness of the control in abating different pollutants (either at their source, or their yield to receiving waters) should be presented. Determination of nonstructural control costs should be based upon the opportunity cost of the control as discussed in Chapter 10.

### 1) Representative Data for Cost and Effectiveness

Since the cost and effectiveness of nonpoint source controls depend on the exact circumstances in which the control is used, cost and effectiveness vary considerably. For purposes of evaluation, cost data should represent the typical or average situations. This will assure that the cost and effectiveness of the control are neither overestimated nor underestimated if the control is being considered for widespread application. Naturally, if the control is only applicable in very specific cases, data should be representative of that specific situation.

### 2) Estimation of Cost and Effectiveness Information

Because the precise cause-effect relationship between application of a given control and achievement of a given reduction of wastes to receiving waters is difficult to define, calculation of cost-effectiveness may require preliminary estimation.

Once a particular nonpoint source problem has been identified, the approximate reduction of the source load that could be obtained through a given control can be determined. Since the cost of the control can generally be assessed with some degree of accuracy, the cost-effectiveness estimation enables an overall ordering of the most feasible controls for nonpoint sources. To the extent that the estimates are difficult to make, some reasonably effective practice should be combined with a monitoring program to assess the effectiveness of the practice.

### c. Propose Best Management Practices for Each Category

After identifying instream pollutant loading from nonpoint sources and examining technically feasible nonpoint source controls, the final step in nonpoint source technical planning is determination of best management practices for existing and new nonpoint sources. This selection process should be based on determining the cost effectiveness of alternative controls for reducing existing and potential loading to a level compatible with water quality goals.

The process of selecting controls for existing and new nonpoint sources is essentially the same in that cost-effectiveness and implementation feasibility should be the criteria for choosing controls. However, for most new sources there are often more options for highly effective management measures and these higher levels of abatement (chosen in the establishment of maximum allowable pollutant loads) should be considered in the selection of best management practices in order to prevent or minimize future pollutant increases.

#### 1) Relationship with Management Program

Selection of best management practices should be closely coordinated with the development of a management program to implement controls for point and nonpoint sources. A management program should establish the following legal, financial, and technical support aspects of best management practices (see Ch. 7.5 for further discussion):

- Regulatory mechanisms, including legal authority to implement and enforce best management practices;
- Fiscal programs to provide incentives to adopt best management practices;
- Technical assistance and interagency coordination to help affected parties comply with regulatory programs.

#### 2) Preliminary Screening of Nonpoint Source Control Options

In order to compare nonpoint source control options, it is necessary to reduce the number of possible options for each category to those that are technically feasible, with adequate documentation of cost and effectiveness. A reasonable number of control options for each significant nonpoint source category should be presented.

### 3) Development of Alternative Subplans

After control options for each category have been developed, they should be combined to form alternative subplans. Each subplan should indicate the cost and effectiveness of possible BMPs in meeting the target nonpoint source load reduction levels.

The following information for each category of nonpoint sources should be presented as an input to the combined evaluation of technical and management plans:

- Wasteload characteristics of each alternative;
- Total cost of each alternative expressed as its present value of capital and operating costs for the overall alternative and subsystem components;
- Reliability of each alternative and subsystem included in each alternative;
- Significant environmental effects of each alternative consistent with NEPA procedures, including a specific statement of future development impact;
- Contribution of each alternative to other water-related objectives of the planning area.

## 7.5 Management Planning

### A. Introduction

The purpose of management planning is to determine the legal, financial, and institutional means needed to implement best management practices. After proposed management practices can be determined from a technical standpoint, it is necessary to examine their implementation feasibility and, if necessary, make adjustment to the originally proposed practices in order to ensure that the selected practices are feasible from a legal, financial, and institutional standpoint. The following management planning procedures are based on the framework for management planning described in Chapter 3.

### B. Define Management Agency(s) and Institutional Arrangements

The first step in management planning should be to define the scope of legal authority, financial capacity, and institutional arrangements to manage nonpoint sources.

### 1. Legal Authority

Legal authority to treat wastes from nonpoint sources or to regulate owners and operators of nonpoint sources according to the management practices proposed in the technical phase of nonpoint source planning should be defined.

### 2. Financial Capacity

The level of public and private expenditure to carry out the management practices and possible financial programs to obtain the funds should be identified.

### 3. Management Agency(s) and Institutional Arrangements

A general description of the type of agency and interagency arrangements to carry out proposed practices should be described.

## C. Management Analysis

### 1. Legal Analysis

An analysis should be made of the existing legal basis for requiring management of nonpoint sources within the planning area. The analysis should attempt to determine the adequacy of the existing law, distinguishing the extent to which authority to regulate nonpoint sources may exist, as opposed to the administrative effectiveness in carrying out the law. Wherever possible the proposed nonpoint source management practices should rely on existing general authority and seek to establish necessary implementing regulations and administrative and enforcement capability. The need for new legislation should also be identified early in the planning process.

### 2. Financial Analysis

For each proposed management practice, a tentative financial program should be developed. This program should identify capital, operating, and administrative costs and sources of financing for the various cost elements. The financial analysis should explore the possibility of relying on existing programs to finance parts or all of the costs for particular cost elements.

### 3. Institutional Analysis

There are many existing agencies and programs concerned with nonpoint source management. An analysis should be made of the extent to which these programs could incorporate the function of land management controls for water quality protection. It is possible that many existing programs could undertake part or all of the responsibilities for implementing best management practices. Where uncertain authority exists for these agencies and programs to undertake management projects or regulate nonpoint source owners and operators, it may be possible to strengthen the authority of these agencies or have the agencies administer a program in cooperation with other agencies and levels of government that have the requisite legal authority. In other instances the legal authority may exist to implement management practices, but insufficient funds may prevent an effective program. In such cases some of the funding sources suggested in Chapter 10 should be explored and expanded budgets proposed for the agencies that otherwise could be effective in implementing management practices. A third deficiency of existing agencies and programs may be lack of a coherent administrative structure to relate water quality and other resource management programs. For example, many public works and land management programs have an impact on water quality; however, water quality protection may not be an explicit goal in these programs. By slight modification in the mission of these existing land and resource management programs, it may be possible to develop effective water quality management institutions. However, it may still be necessary to develop coordination mechanisms between the many institutions having the potential to carry out water quality management.

The following is a partial list of existing agencies and levels of government that may have the potential to carry out nonpoint source management:

| | Federal | State | Regional County/Local |
|---|---|---|---|
| . Agriculture | Soil Conservation Service | Dept. of Agriculture | Soil Conservation Districts |
| . Silviculture | Forest Service | Dept. of Natural Resources | |
| . Mining | Federal Bureau of Mines | Dept. of Mining | |
| . Construction | Dept. of Housing & Urban Dev.<br>Dept. of Trans. | Dept. of Trans. | County/Municipal Engineer<br>Municipal Bldg. Inspector |

| | Federal | State | Regional County/Local |
|---|---|---|---|
| . Urban Runoff | Dept. of Housing & Urban Dev. (Flood Insurance Program) | | County Municipal Engineer<br>Sanitary Sewage Authority |
| . Hydrologic Modification | Dept. of Army, Corps. of Engineers | | |
| . Source Affecting Ground Water | | State Dept. of Health | Local Dept. of Health |
| . Residual Waste Disposal | | | Regional County and Municipal Departments of Sanitation |
| . Public Land/Resource Mgmt. Activities Affecting Above Nonpoint Sources | Dept. of Interior<br>Bureau of Land Mgmt.<br>Bureau of Reclamation<br>Forest Service<br>National Park Serv.<br>Federal Power Comm.<br>Dept. of Army, Corps of Engineers | State Land Resource Managing Agencies | County, Local Parks Departments |

The analysis of existing programs having the potential to implement nonpoint source management should lead to specific proposals for organizations to implement the management practices developed in the technical phase of planning. Depending on the results of this analysis, the function of technical development of proposed best management practices may be delegated to an agency having particular expertise in nonpoint source management. Whatever agency has the responsibility for technical development of BMPs, there should be close coordination between the technical phase of BMP development and the selection of management agencies to supervise BMP implementation.

## D. Development of Alternative Management Plans

### 1. Propose Alternative Management Options

For each category of sources and each major technical alternative for BMP management, options to implement the BMP should be proposed. These options should identify the source of legal authority for the management practice (including proposed schedules for enabling legislation, if necessary), a proposed financial program identifying existing or new sources of funding, and the agency(s) proposed to provide technical assistance, supervise, monitor, and enforce BMP implementation. In addition where many agencies are proposed for different source categories, the management structure to coordinate these agencies and to integrate nonpoint source management into the overall State WQM Plan should be identified.

## 2. Assessment of Management Alternatives for Consistency with Technical Proposals

Since technical BMP proposals may vary in their complexity, it is important to determine whether the agency proposed to supervise their implementation has the necessary manpower, expertise, and financial resources to administer the particular technical proposal.

## 3. Screen in Terms of Implementation Feasibility

Before final selection of BMPs, the proposed management approach for each category of sources should be evaluated according to the criteria of implementation feasibility discussed in Chapter 3. The following evaluation should be made for the BMPs proposed for each category of sources:

- legal authority: Is there adequate authority, or an adequate legislative proposal to acquire the authority called for in Section 208(c)(2) of the Act and for the regulatory program specified in Section 208(b)(2)(C) of the Act?

- financial capacity: For public sector projects, are there adequate funds or a specific legislative proposal to acquire such funds? For BMP costs to be borne by private landowners, are the costs reasonable and affordable; is adequate provision made to phase implementation of the BMP according to the capacity of landowners to bear the costs? For overall program management, are there sufficient resources devoted to supervision of the entire nonpoint source management effort, in addition to the separate administrative costs of each program element?

- institutional feasibility: Is the management approach practical in the sense of relying on available programs where possible? Is the management approach administratively coherent, with adequate supervision of each program element and of the program as a whole? Is there broad public understanding and acceptance for the management approach?

## 4. BMP Selection

The selection of BMPs should be undertaken as part of the overall plan evaluation and selection process described in Chs. 13 and 14.

# CHAPTER 8

# POINT SOURCE CONSIDERATIONS

## 8.1 Introduction

Chapter 3 presents a framework for systematic evaluation and selection of pollution control strategies for all sources of pollutants. This chapter describes technical planning considerations for developing alternatives abatement measures for point sources of pollution. The point sources considered in this chapter are discharges from municipal treatment plants, combined sewer overflows, and industrial waste effluents. Disposal of wastewater sludge, and wastewater reuse are also discussed. Balanced consideration of measures other than the traditional capital intensive approaches of point source control is stressed in this chapter. Alternatives considered should encompass all applicable structural and management measures for preventing, abating, reducing, storing, treating, separating, recycling, reclaiming and disposing of municipal and industrial wastewater and combined sewer discharges.

## 8.2 Planning Approach for Point Sources

### A. Inputs

#### 1. Water Quality Analysis

-- problem assessment:

The problem assessment should indicate where planning is needed for existing point source problems. A determination of planning needed to prevent future problems can be made by evaluating projections of future population, employment, land use, wasteloads.

-- segment classification:

The segment classification should indicate the type of wasteload constraints that will be required of point source. Where waste load allocation is required, it is important to choose a planning approach allowing consideration of tradeoffs between all sources requiring load allocation.

-- maximum allowable loads:

In Water Quality Limited segments, the maximum allowable load for pollutants provides the planning constraints that should be met in developing abatement strategies.

### 2. Priorities

Before developing abatement strategies for point sources, it is important to determine the level of detail of the outputs of these strategies. If the abatement measures are to be implemented in the next five years, all the outputs for point sources specified in Table 3.1 should be developed at a level of detail sufficient for implementing the outputs. (The relationship between the facility plans outputs provided in the State WQM Plan and further facility planning is described in Chapter 2). Where the particular element of the plan cannot be implemented in the next five years, the level of detail may consist of a more general assessment having the type of information indicated in Table 3.2

## B. Choice of Methods (and Level of Detail) for Relating Water Quality Analysis to Development of Abatement Measures

### 1. Water Quality Limited Segments - Area Approach

The area approach to developing abatement measures is described in Chapter 3. A detailed procedure to carry out this approach, relating pollution loads to land use plans and policies is described in Chapter 6. It is recommended that the area approach be followed for developing point source subplans in Water Quality limited segments. The reason for this recommendation is that the area approach encourages evaluation of alternative levels of abatement and alternative discharge locations for point sources, allowing the maximum flexibility in the waste load allocation process.

### 2. Effluent Limited Segments

The waste load constrained in effluent limited segments would be established in the effluent guidelines for the particular point source category.

## C. Development of Abatement Plans

The following sections (Chapter 8.3-8.6) describe procedures for developing alternative abatement plans for municipal, private wastewater combined sewer, and industrial point sources. These alternatives should be combined into alternative area subplans for point sources as described in Section 8.7.

## 8.3 Municipal Wastewater Facilities

## A. Introduction

Planning of municipal facilities within an area should provide for (1) cost-effective, environmentally sound, and implementable treatment works to meet the present needs of the area and (2) a general program to phase facilities development to meet future needs as projected in an overall land use plan. Balanced evaluation of nonpoint source abatement and prevention measures as well as point source measures should precede final selection of the treatment works. Treatment works must meet the applicable requirements of Sections 201(g), 301, and 302 of the Act. As a minimum, facilities plans must provide for application, by 1983, of the best practicable waste treatment technology (BPWTT). Where necessary to meet wasteload allocation constraints consistent with water quality standards, plans must provide for measures to further reduce pollutants. The determination of BPWTT, or measures providing for higher treatment levels if needed, is based upon evaluation of technologies included under each of the following waste management techniques:

a. treatment (biological or physical-chemical) and discharge to receiving waters;

b. treatment and reuse;

c. land application or land utilization

Comparision of the above techniques and determination of BPWTT for a specific case should include considerations for management of nutrients in wastewater and sludges, development of integrated (solid, liquid, and thermal) waste facilities, and enhancement of recreation and open space opportunities.

This section covers major aspects of the municipal wastewater facilities planning presented in the EPA document entitled "Guidance for Facilities Planning".

## B. Delineate Service Area

Service areas for municipal waste treatment facilities should be delineated based on the population, economic, land use, and waste load projections discussed in Chapter 3. In general, a treatment service area includes the sewered areas tributary to an integrated waste treatment system plus those additional portions of watersheds likely to be connected over the planning period.

The delineations should outline, on at least a preliminary basis, geographic areas sufficient to permit cost-effectiveness analyses of alternatives, including waste treatment methods and ultimate disposal options for sludge and treated effluents. Also, each of the areas should be of sufficient size to consider cost savings, management advantages, or environmental gains resulting from regionalization. Given these concepts, service areas for waste treatment systems and ultimate sludge disposal or utilization are not necessarily the same. For example, sludge from two (or more) separate treatment service areas could be land-filled or used as a soil-conditioner at a common site; in this case, the sludge disposal service area would include the separate treatment service areas.

In smaller SMSAs (less than 100,000), or those with few political entities or public bodies having jurisdiction over sewage disposal, the service areas should encompass either the entire SMSA or the core city plus contiguous urban places. The fact that service areas are delineated does not necessarily imply that all land within a service area should, be serviced by municipal sewage collection and treatment systems. In fact, in many less densely populated areas, or parts of urbanized areas there are economic and environmental advantages to on site disposal of waste. The service area delineation merely represents a potential area in which to investigate possible municipal treatment systems.

In larger urban areas, single facilities plan coverage of the entire area may be unattainable or inappropriate for institutional, geographic, or other reasons. Service areas should still encompass contiguous waste treatment systems when these conditions occur: 1) such systems may require major new or expanded treatment plants, sludge disposal or effluent disposal facilities; and, 2) system interconnection or joint facilities would be feasible alternatives.

Recognizing the considerations discussed above, service area boundaries for non urban areas should encompass the entire community including those areas subject to future urban development. Where cost savings or other advantages might result from waste treatment system interconnect joint effluent or sludge disposal facilities, or collective management for two or more nearby communities, the service area should encompass the community group. If a community is isolated sufficiently to preclude regionalization, the service area should be confined to that community.

The delineated service areas should be outlined on maps to the same scale as those used in the projected population and land-use presentation (Chs. 3 and 6).

## C. Inventory Existing Conditions and Determine Existing Flows

The existing waste treatment systems must be accurately assessed to establish a basis for planning any systems modifications. Where available, the Phase I Plans will provide essential information on municipal point sources, waste loads, wastewater flows, and water quality within the planning area. Data from permits would be an additional source of information. At the start of planning, this data should be reviewed and supplemented as necessary. The assessment of each existing waste treatment system should include a performance evaluation of the treatment plant, including operating problems and personnel, and sampling and maintenance program. Data on current performance of many treatment facilities will be available from State water quality agencies as a result of their programs involving operations and maintenance visits and consultations. An infiltration/inflow analysis should also be made on a preliminary basis to determine whether excessive infiltration or inflow exists and, on a preliminary basis, costs of any corrective measures required. Should the analysis determine the existence of excessive infiltration/inflow, a more detailed sewer system evaluation survey should be made to specifically define problems and determine types and costs of corrective measures. A State WQM planning grant cannot be used for the detailed sewer evaluation survey; however, grant assistance may be obtained under a construction grant (40 CFR 35, Subpart E). To assure satisfactory management of residual wastes, an inventory of sludge utilization and disposal should also be conducted.

## D. Estimate Future Waste Loads and Flows

To provide a basis for planning and preliminary design of facilities, future variations of waste loads and the flows over the planning period must be forecast. As described in Chapter 3, forecasts must be based on economic and demographic growth trends for the planning area and should be based upon evaluation of land use plans, and any growth contraints imposed by air quality implementation plans, zoning restrictions or permit conditions. The effects of selected flow and waste reduction measures, including sewer system rehabilitation to correct infiltration/inflow, should also be reflected in the flow forecasts to permit subsequent calculation of waste treatment system cost reductions.

### 1. Land Use and Development

Wastewater load and flow projections should conform to the time phased development shown on the land use projections that are proposed as being compatible with water quality goals. (See Chapter 3 and 6). To avoid changes in the growth pattern from that projected in the land use plan, schedules of hookups should be developed through a regulatory program. (See Chapter 9).

### 2. Flow and Waste Load Forecasts

The expected economic and population growth patterns for the planning area, as projected in the land use plan, should be translated into estimates of wastewater flows and waste loads, with a realistic allowance for unpreventable infiltration. The estimated future changes in flows and waste loads from industries served by the municipal system should reflect application of EPA pretreatment requirements for existing and new industries plus any expected process changes affecting wastewater and treatment residuals. Wastewater flow forecasts should also include the and anticipated discharges from septic tank pumpages into the systems.

### 3. Sludge Generation Forecasts

The volumes and composition of sludge which will be generated from treatment of wastewater should be estimated. These forecasts should be modified to reflect the different treatment levels characteristic of the alternative systems considered.

## E. Develop and Evaluate Alternatives

Since the facilities element of State WQM planning does not necessarily imply larger interconnected waste treatment systems for an area, the initial planning for facilities systems should involve a systematic comparison of many subsystem, as well as system, options. For each municipal wastewater system, subsystem options should be identified. Compatible options should be combined into preliminary treatment systems consistent with the alternative wasteload allocation sets.

By using a rough estimation of cost and impact, the components of the alternative facility plan should then be screened on the basis of goal attainment, monetary costs, and environmental, social, and economic effects. Legal or institutional constraints and implementation feasibility should also be considered. Unacceptable alternatives should be rejected; those remaining should be developed into a limited number of proposals, employing each of the previously discussed waste management techniques. Adequate justification should be given for eliminating any of those techniques at any stage.

The following paragraphs briefly describe major factors that might be considered and procedures that might be applied in the development and evaluation of alternative wastewater systems. However, the following factors should only be considered to the extent needed to develop the required facilities element of a State WQM Plan:

### 1. Flow and Waste Reduction Measures

The Act encourages the use of a variety of methods where cost-effective for reducing both the volume and amount of waste within municipal wastewater systems. Some of the following measures would reduce not only wastewater loads, but water supply demands as well:

a. Infiltration/inflow reduction by sewer system rehabilitation and repair, and elimination of roof and foundation drains.

b. Household water conservation measures, such as water saving appliances and fixtures.

c. Water and wastewater rates that impose costs proportional to water used and wastewater generated; use of water meters.

d. Educating the public on the value of water resources and the need to reduce water consumption.

## 2. Industrial Service

Municipal waste treatment systems should be planned to serve industrial users of the area whenever practicable and cost-effective. Special requirements, issues, and procedures associated with industrial use of a municipal system are covered in section 8.6 of this chapter.

## 3. Sewers

### a. System Configuration and Capacity

Planning of a waste treatment system includes the comparison of alternative arrangements of interceptors and collection pipes, including phased development, to assure selection of a cost-effective configuration. In newly developing portions of the planning area, the capacities of the system, in particular the larger lateral and interceptor sewers, should generally accommodate not more than the 20-year wastewater projection based upon the land use plan. However, choice of interceptor and collection pipe sizes should reflect cost-effective analysis of alternatives over the planning period. The practice of designing interceptors for long-term projected growth or ultimate development within the service area should be discouraged. As an alternative, consideration should be given to interim (short-term) treatment works for outlying areas or to septic tank units for individual or clustered developments in low density areas.

### b. Sewer Hookup Schedules

Since the capacity of the facilities and design of the treatment system is based on flow projections which conform to a time-phased land use plan, it is necessary to establish a schedule for hookups in the system. A hookup schedule is important in managing the system over time in order to prevent growth from exceeding the designed capacity of the system.

In the event that a violation of an NPDES permit occurs due to overloading of treatment works, the Regional Administrator (or the State if the NPDES program has been delegated to a State) may, under authority of Section 402(h) of the Act, seek a court order imposing a ban or restrictions upon sewer connections. A series of planning and management actions to prevent overloading of facilities may be included as special conditions to permits issued to facilities in danger of imminent overloading.

Since the State WQM Plan is to include a regulatory program to regulate location of pollutant discharges in the area, and since the management agency(s) must possess authority to refuse to treat wastes from a municipality or subdivision which does not comply with the plan, a schedule of hookups is an appropriate management approach for carrying out this regulatory program. The enforcement of the schedule through the regulatory program may require specific authorizing legislation and will therefore necessitate thorough legal analysis. (See Chapter 9.)

### 4. Waste Management Techniques

Alternative waste management techniques must be evaluated to determine the BPWTT for meeting applicable effluent limitations, including those related to wasteload allocation. Information pertinent to this evaluation is contained in an EPA document entitled "Alternative Waste Management Techniques for Best Practicable Waste Treatment" (Proposed in March 1974). Selection of a waste management technique is closely related to effluent disposal choices. Preliminary alternative systems featuring at least one technique under each of the three categories (treatment and discharge, wastewater reuse, and land application or land utilization) should be identified and screened. Techniques which incorporate wastewater reuse and land application should be utilized whenever possible. A more detailed proposal should be prepared for each unless adequate justification for eliminating a technique during the screening process is presented.

Published cost, performance, and other information is available for many alternative treatment technologies. Preliminary screening of these technologies involves comparing costs and relative treatment capabilities.

a. Treatment and Discharge

Treatment and discharge techniques include the following:

(1) Biological treatment including ponds, activated sludge, trickling filters, processes for nitrification, and denitrification;

(2) Physical-chemical treatment including chemical flocculation, filtration, activated carbon, breakpoint chlorination, ion exchange, and ammonia stripping.

b. Wastewater Reuse

In comparing waste management techniques and alternative systems, wastewater reuse applications should be evaluated as a means of contributing to local water management goals. Such applications include:

(1) Industrial processes;

(2) Groundwater recharge for water supply enhancement or preventing salt water intrusion;

(3) Surface water supply enhancement;

(4) Recreation lakes;

(5) Land reclamation.

Wastewater reuse needs should be identified and defined by volume, location, and quality. These needs may influence the location of the treatment facilities, the type of process selected, and the degree of treatment required.

c. Land Application

The application of wastewater effluents on the land involves the recycling of most of the organic matter and nutrients by biological action in the soil and plant growth, generally providing a high degree of pollutant removal. Planning of the land application techniques should reflect criteria and other information contained in the EPA document on "Alternative Waste Management Techniques for Best Practicable Waste Treatment."

Land application techniques include:

(1) Spray, ridge and furrow, and flood irrigation techniques;

(2) Overland flow;

(3) Infiltration-percolation;

(4) Other approaches such as evaporation, deep well injection, and subsurface leach fields.

## 5. Residual (Sludge) Management

Evaluation of alternatives for management of residual wastes from municipal treatment works should be closely coordinated with the evaluation of each waste management technique. Such evaluation includes the evaluation of alternative combinations of sludge processing and utilization techniques for satisfactorily and economically disposing of quantities of residual wastes. Care must be taken to assure that these methods do not appreciably add to air quality or water quality problems.

A variety of sludge processing and utilization techniques are available including (a) thickening, (b) chemical conditioning, (c) chemical stabilization, (d) aerobic and anaerobic digestion, (e) dewatering, (f) thermal processing for volume reduction or drying, (g) composting, and (h) land spreading as a soil conditioner. Sludge disposal options are limited primarily to land disposal, land utilization, and incineration, and must comply with the EPA policy statement on acceptable methods, based on current knowledge, for the ultimate disposal of sludges from publicly-owned wastewater treatment plants.

Disposal techniques such as soil conditioning and land utilization which realize the nutrient value of sludge as fertilizer should be given special attention in adopting a sludge disposal program for the area. Furthermore, consideration should be given to local air pollution control regulations and energy rquirements if incineration is an option. (Guidance on management of residuals in general is contained in Chapter 7.)

6. Location of Facilities

Evaluation and choice of sites for treatment plants, interceptors, transmission lines, outfalls, pumping plants, and other major works should comply with the land use plan. Factors to be considered in selecting location include:

a. Possible odor and aesthetic problems;

b. Flexibility to convert to possible future reuse and additional pollution abatement needs;

c. Special protection of potable, shellfish, and recreation waters;

d. Avoidance of floodplain and wetland areas, if practicable;

e. Induced growth impacts in flood hazard or environmentally sensitive areas.

7. Regionalization

Regionalization options should be evaluated to assure use of the most cost-effective facilities systems consistent with the planning area's waste management needs. Various combinations of treatment plants, interceptors and other works should be identified; and each should be consistent with a target wasteload allocation. The economy of scale associated with a large treatment plant should be balanced with consideration of environmental and social impact, especially if the inter-connected system would tend to induce growth patterns conflicting with the land use plan. The effect of streamflow depletion due to transport of wastewater to a downstream plant, and the impact of concentrating wastes from plant effluents at fewer points should also be considered. The evaluation of regionalization might lead to reconsideration of the service areas that were initially chosen for developing the facilities element of the State Water Quality Management Plan.

8. Phased Development

a. General

In examining the cost-effectiveness of a waste treatment system, two alternatives should be considered: (1) initial provision of sufficient capacity to serve the needs of the area as projected over the planning period; and (2) phased development of systems and modular construction of individual facilities within the system to meet future needs. The phased and modular development option would involve planning for construction of facilities and facilities components at intervals throughout the planning period to accommodate projected increases of waste loads and flows. The following factors should be included in an assessment of the options: the service life of the treatment works; the incremental costs; and flow and waste load forecasts.

### b. Reserve and Excess Capacity

The planning of waste treatment facilities will normally provide some excess capacity to allow for daily, wet weather, and seasonal flow variations as well as projected flow increases. The system capacity excess should be examined from a cost-effective viewpoint, particularly for treatment plants serving areas experiencing growth where phased construction may be more cost-effective than initial construction for long-term capacity needs. Provision of holding storage at the plant intake should also be considered to equalize daily flow variations.

### c. Phased Development of System

Phased development of the system is advisable in rapidly growing areas, in areas where the projected flows are uncertain, or where full initial development of facilities would tend to distort growth from that shown in the area land use plan. The phasing should provide sufficient excess capacity at the beginning of each construction phase to accommodate expected flow increases during the phase. Phasing of sewers may involve provision of parallel or multiple systems or extension of single lines.

### d. Modular Development of Individual Facilities

Modular development of individual facilities is advisable in areas where high growth rates are projected, where the required degree of treatment must be upgraded later in the planning period, or where existing facilities are to be used initially but phased out later. Modular development would avoid long-term operating problems associated with underutilization of certain components of the plant. Where modular development is used, provisions should be made during the design of the initial facilities for future additions.

### e. Interim Facilities

After the State WQM plan has been approved, [illegible] NPDES permit issued may be in conflict with that plan. Since interim facilities receive permits, they must be considered in the planning process. Such facilities are often used to treat wastes from areas not immediately serviceable by larger, often regional, treatment facilities. Careful consideration should be given to the way in which interim facilities will be used, especially in high growth areas. Since such facilities have the potential for inducing development that may be in conflict with regional service plans, special attention should be given to the interim facilities' eventual connection to the larger system. Thus, in planning for interim facilities, particular consideration should be given to:

(1) Ensuring that the area to be served by the interim facility is in conformance with land use plans and controls;

(2) Ensuring, through the establishment and enforcement of a schedule of hookups for the life of the facility, that the interim facility will not be overloaded;

(3) Ensuring when the facility is no longer needed, that its service area is transferred to a permanent facility;

(4) Reusing the abandoned facility for some other needed function, such as use as a pumping station;

(5) Ensuring proper operation, maintenance, and inspection. (Trained, certified operators should be used.)

### f. Flexibility and Reliability

Flexibility and reliability should be considered throughout the planning of municipal facilities. As mentioned in previous sections, flexibility factors include possible upgrading of water quality objectives, future application of new technologies, future application of wastewater reuse, modular and phased development of facilities, and temporary treatment plants.

Reliability considerations are important since a risk of failure exists in any wastewater system. With a view toward minimizing this risk, the probability, duration, and impact of such failures should be considered for each system and its components.

## 8.4 Other Point Sources

The identification of other point sources within the planning area, possible control options, and feasible controls should be included in point source subplans. In particular, private wastewater systems should be evaluated, preferably in conjunction with the municipal wastewater facilities. Information regarding planned capacity of such systems should be sought from private wastewater management agencies. Planned capacity should be reviewed for consistency with future waste load reductions. Any point sources required to obtain permits should be included in point source subplans.

## 8.5 Combined Sewer Discharges

### A. Introduction

Combined sewer overflows can be sources of significant quantities of pollutants. Since they are an integral part of the municipal wastewater collection system, untreated overflows from combined sewers pose an added threat to public health.

Various techniques for controlling and treating combined storm and sanitary sewer flows can be incorporated into alternative areawide subplans for point sources. Quite often, these problems can be substantially reduced through effective control of the sources and/or the runoff before it enters the combined sewer systems, as is discussed in Chapter 7. The most cost-effective combination of controlling the problems at their source or controlling the runoff once it enters the stormwater system can be made in the later steps of the planning process where alternative subplans for point and nonpoint sources are combined into alternative plans. (Chapter 3.6.E.)

## B. Inventory Existing Conditions

An inventory of existing combined sewer systems should be conducted to the extent data are available; the inventory should include locations and condition of intake bypasses, pipes, regulatory equipment and other features, and an assessment of both the existing performance of the system and its optimum performance with intensive management, operation and maintenance. Information on flow variations, design capacities, wastewater constituents, and waste loads is also needed. Where flow records are lacking, estimates of overflows and discharges based upon observations should be correlated with rainfall amounts. Wasteload estimates should be based on pollutant sampling and subsequent tests for dissolved oxygen (DO), biochemical oxygen demand (BOD), ammonia nitrogen ($NH_3$-N), phosphates ($P_2O_5$), total solids (TS), suspended solids (SS), toxics, and both total and fecal coliform counts.

## C. Estimate Future Waste Loads and Flows

To provide a basis for planning of control measures, forecasts should be made of the waste load magnitude, intensity, and duration of the problems associated with discharges throughout the planning period. Information on existing discharges can provide a convenient base for the estimates. Flow volumes and waste loads during storm periods should be related to the tributary drainage area; the resulting information can permit forecasting of flow volumes and waste load increases resulting from future changes in land use and development. This information can provide the basis for estimating flows in combined sewer systems within the planning area. Adjustments in projections should be made to account for density changes, reduction in pollutant discharges due to future protection of environmentally sensitive areas as reflected in the land use plan, and probable flow and waste reduction measures.

## D. Develop and Evaluate Alternatives

The development of alternative areawide control of combined sewer overflows involves the systematic comparison of feasible control options, both structural and non-structural. Operational strategies should be explored for the entire system to maximize use of the system capacity. EPA research has demonstrated many types of control and treatment techniques for combined sewer overflows. Among these, storage options, both upstream from the system or within the system, appear feasible. However, this capacity would generally be limited to the most highly polluted initial storm runoff from a low-frequency storm event (one chance in one, to one chance in five of being equalled or exceeded during any single year).

Specific factors to be considered in the development evaluation of combined sewer discharge subplan components are contained in the following paragraphs. In general, the most cost-effective solution will be a mixture of operation/maintenance and construction techniques.

1. Flow and Waste Reduction

A variety of techniques can be used for reducing flow volumes and waste amounts which enter the system. Consideration of these techniques should be coordinated with nonpoint source control options planned for the tributary drainage area. They include:

a. Reduce disturbance of land cover and maintain surface infiltration capacities;

b. Control patterns and densities of urban development;

c. Reduce nonpoint source runoff through control measures for urban and construction activities;

d. Preserve or manage lands that have natural or existing characteristics for retarding or reducing flow and surface pollutants;

e. Control surface runoff and in-system runoff by use of permeable material for paving, flow retardation structures, and other means of storing and retarding runoff, including planned intermittent shallow flooding of parking areas, streets and other surfaces where damage would be minimal.

In State WQM planning, emphasis should be placed on use of the above management practices as alternatives or supplements to the control measures discussed below, as the former are generally far more cost-effective and less environmentally disruptive. Management of runoff is further discussed in Chapter 7.

2. Alternative Control Techniques

Alternative control techniques that should be considered in combined sewer overflows can be grouped into the following five categories:

a. Separation of sewage and storm collection systems (generally the most costly and least environmentally acceptable approach);

b. Operational control of the existing system (maximum use of the system storage by computerized flow regulation and subsequent treatment at the plant);

c. Storage at points within the system or at the point of discharge, and subsequent treatment;

d. Direct treatment of overflows (in-line high rate treatment methods);

e. High level of maintenance including periodic flushing of sewer systems.

## 8.6 Industrial Wastewater

### A. Introduction

The overall objective of planning for the control and treatment of industrial wastewater is to provide the most efficient approach for serving the present and future industrial wastewater treatment needs of the area. Treatment techniques must meet the applicable requirements of Sections 204, 301, 302, 304, 306, 307, and 316 of the Act. Industries served by municipal systems must comply with pretreatment and cost recovery requirements. Direct discharge of industrial wastes to receiving waters must comply, at a minimum, with the provisions of the pertinent Effluent Limitations Guidelines and New Sources Performance Standards. Higher treatment levels or internal wasteload reductions will be required where wasteload allocations dictate more stringent restrictions. Application of higher treatment levels to meet water quality standards can be mitigated through restricting the location of future industrial development to areas where receiving waters can more readily assimilate the treated wastewater. Control of industrial location should be incorporated into the land use plan with recognition of other constraints such as air quality control.

The procedures for evaluating industrial waste sources and problems are basically parallel to those presented for municipal wastewater systems in section 8.3 of this chapter.

Wastewater flows from all major industrial sources in the area should be accurately assessed. Existing information should be used where available, including information on those industries that discharge into municipal systems. To estimate design flows and wasteload reductions, information is needed on average flow rates, flow variations, seasonal variations, wastewater characteristics and constituents, and mode of disposal. Particular emphasis should be given to toxic constituents within the wastes and to thermal pollutants present. Forecasts should be made of the future variations of wasteloads and flows over the planning period and the discharge locations of those wastes. These forecasts should be based upon economic and industrial trends, types of industries and constituents of associated wastes, location constraints imposed by land use plans, and other restrictions imposed by industrial permits and air quality implementation plans. Attention should be given to estimating waste sludges and slurries generated by the industries as well as to the influence that industrial loads will have on treatment plant sludge. The effects of user charges, pretreatment, and effluent limitations guidelines or higher treatment levels on water and wastewater flows should be incorporated into the projections.

## B. Develop and Evaluate Alternatives

The development of alternative approaches for treatment of industrial wastes and the degree of treatment involves a systematic comparison of the following options:

1. Pretreatment and discharge of wastewater to municipal systems;

2. Direct treatment by individual industries and discharge of wastewater into receiving waters;

3. Direct treatment and discharge by groups of industries;

4. Reuse of industrial wastewater;

5. Land application.

In conjunction with each of the above options, consideration should be given to discharge to either water or land and to the effects of flow and waste reduction on internal recycling and process changes. Areawide options should be identified in terms of meeting wasteload allocation constraints and compared to provide a rough assessment of costs and impact. Consideration should also be given to institutional constraints and feasibility.

Specific issues that might be addressed in formulating alterntaives are included in the following paragraphs:

### 1. Flow and Waste Reduction

The flow and waste reduction as it relates to those industries that discharge or will discharge into municipal systems should be assessed. Increasingly stringent technical and financial requirements on industry should lead to process changes that use less water and create less wastewater.

## 2. Minimum Effluent Limitations

Industrial wastewater treatment must comply with the minimum treatment requirements for Best Practicable Control Technology (BPT) and Best Available Control Technology (BAT) by 1977 and 1983, respectively. These treatment requirements are set forth for the industries cited in Section 306 of the Act in a series of EPA documents entitled "Development Document for Effluent Limitations Guidelines and New Source Performance Standards for __________ Point Source Industry." These guidelines contain criteria for each industry for Best Practicable Control Technology Currently Available (known commonly as BPT) and Best Available Control Technology Economically Attainable (known as BAT). The guidelines also provide minimum criteria for New Source Performance Standards and New Source Pretreatment Standards.

## 3. Joint vs. Separate Municipal and Industrial Facilities

Municipal waste treatment systems should be planned to serve industrial users of the area whenever practicable and cost-effective. Because of the unusual economy of scale associated with larger municipal-industrial facilities, as compared to separate municipal and industrial facilities, a joint system will often be cost-effective. In many cases, however, it may be more economical to have separate industrial treatment facilities because of the characteristics and quantities of industrial waste, industrial pretreatment requirements, and industrial locations and groupings which facilitate joint industrial treatment and/or reuse of industrial wastewater. These considerations are also relevant to the cost and effectiveness of sludge disposal options for each alternative facility.

Industrial use of municipal facilities should be encouraged where total costs would be minimized. Where industrial flow handled by municipal systems is significant, cost of separate treatment of industrial wastes versus cost of pretreatment and joint municipal-industrial facilities should be compared. This involves comparing the incremental cost of the municipal facilities required to transport, treat, and dispose industrial wastes (and the costs of corresponding pretreatment required) with the cost of separate industrial treatment and disposal facilities of those wastes. In particular, the analysis should cover those industries desiring, but not receiving, municipal service when facilities planning is initiated.

### 4. Pretreatment and Cost Recovery

Industrial wastes served by municipal systems must comply with industrial pretreatment and cost recovery regulations. The pretreatment regulations basically require the removal of industrial waste constituents that are not compatible with the municipal wastewater treatment process. Compatible wastes, generally BOD and suspended solids, can be passed to the municipal plant for treatment. The cost recovery regulations prescribe that industrial users must bear a proportionate share of the cost of operating and maintaining the municipal system and must repay the portion of the Federal grant attributed to that waste. Industrial sites should be located where receiving waters can more readily assimilate the residual wastes and associated nonpoint source runoff. Such control of industrial locations should be incorporated into the land use plan and recognize other constraints such as air quality control.

## 8.7 Development of Alternative Subplans

The alternative subplans for point source controls should correspond to alternative wasteload allocation sets for design conditions for meeting water quality standards under both dry weather and rainfall conditions. At least one subplan should be developed to correspond to each wasteload allocation set. Subplans for continuous point sources, primarily from municipal and industrial treatment works, should satisfy the wasteload allocation sets for dry weather conditions. Subplans for combined sewer flows should correspond to wasteload reductions for design conditions reflecting rainfall.

### A. Continuous and Seasonal Point Source Subplans

Investigation of controls for municipal and industrial wastewater may reveal control options that do not correspond to the target wasteload reduction sets previously considered. Additional wasteload reduction sets should be developed if necessary to enable consideration of reasonable point source control techniques.

### B. Intermittent Point Source Subplans

Subplans for intermittent point sources such as combined sewer discharges should correspond to target wasteload reduction sets prepared to enable standards to be met under wet weather conditions. As discussed in Chapter 3, calculation of treatment levels required to meet standards at wet weather conditions should be based on point source treatment levels established for dry weather conditions. Thus, the additional wasteloads carried to streams after rain should be dealt with through load reduction for intermittent point sources and nonpoint sources.

C. Disposal of Residual Wastes

Point source subplans should provide for the disposal of sewage treatment plant residual wastes and should conform with an areawide program of solid waste disposal.

D. Description of Alternative Subplans

Following the screening of the system alternatives, the following information on the alternative subplans should be presented as an input to the development of pollution control alternatives (refer to Chapter 3.6.E.).

- Wasteload characteristics of each alternative expressed in appropriate units for relating to the water quality prediction model;
- Total cost of each alternative expressed as its present value or average equivalent value of capital and operating costs for the overall alternative and subsystem components;
- Reliability of each alternative and subsystem included in each alternative;
- Significant environmental effects of each alternative consistent with NEPA procedures, including a specific statement on future development impact;
- Contribution of each alternative to other water-related objectives of the planning area.

# CHAPTER 9

# MANAGEMENT RESPONSIBILITIES AND INSTITUTIONAL ARRANGEMENTS

## 9.1 Introduction

Institutional arrangements for water quality management are the formal structure of affected government units responsible for implementing the plan. Units within this structure must have adequate authority to carry out the full range of management responsibilities (functions) including, particularly, the regulatory and waste treatment management requirements of the Act. It is also essential that the arrangements assure proper management and accountability for program operations.

Sufficient institutional arrangements and authority for plan implementation may exist when water quality management planning begins. However, the specific authority required by the Act to be vested in the implementing agency(s) will rarely have been delegated under State law to any particular government entity. Where sufficient institutional arrangements and authority do not exist, enabling legislation must be sought and/or arrangements for plan implementation must be created. Management agency designations cannot be fully approved by EPA unless the agencies have adequate statutory authority and the regulatory programs required to implement the plan.

The planning agency should take the lead role in formulating institutional arrangements in conjunction with other State and local agencies. This chapter discusses the general responsibilities of the implementing agency(s), the particular tasks associated with the regulatory and waste treatment management programs and issues associated with the selection of appropriate institutional arrangements.

## 9.2 General Management Responsibilities

The implementation of a State water quality management plan depends upon the implementing agency(s) carrying out a number of related functions for which they must be prepared through adequate authority, resources and organization.

### A. Program Supervision and Coordination

Institutional arrangements must assure that the overall program of waste treatment and regulation of pollution sources is coordinated, the plan implemented, and its performance assessed. It is essential that overall supervision of the program and accountability for its operation be achieved through the designation of an agency to possess the authority and resources for program oversight. The selection of the appropriate unit to which this responsibility will be allocated will require careful consultation among all the major institutions affected by the State WQM planning process. Program supervision is needed both at the State level and in each planning area. A lead agency should also be selected for each planning area to supervise planning activities within the area.

### B. Continuous Planning

Because implementing a program to abate all sources of water pollution will require continual attention to changing conditions and pollution control needs, continuing planning is an integral part of the State WQM Plan. This continuing planning responsibility must be allocated within the institutional framework. This responsibility may be delegated to a lead agency within each planning area.

### C. Fiscal Management

A major responsibility of institutions implementing the State WQM Plan will be obtaining and budgeting the financial resources necessary for plan implementation. Among other things, this will mean establishing financial arrangements to support the regulatory and waste treatment programs, together with arrangements for the funding of continuing planning operations and other administrative expenses. Since financial arrangements are a crucial component in an effective management strategy, their detailed operation must be clearly established prior to plan implementation. Financial arrangements are discussed in more detail in Chapter 12.

## 9.3 Regulatory Program

The regulatory program formulated by the agency must contain the following elements specified in Sec. 208(b)(2)(C) of the Act:

1. The identification of all pollution sources in each planning area and an indication of which agencies have been designated for their regulation.

2. An indication that agency(s) with regulatory responsibility possess the statutory authority, or have initiated legislative proposals to obtain the authority to carry out this activity and to utilize the specific forms of regulation called for in the program.

3. An indication of which form(s) of regulation (land use, permits, licenses, pretreatment standards, associated fiscal policies, etc.) will be applied to pollution sources.

4. Specification of the technical requirements to be incorporated into the regulation.

5. Provisions that those affected by regulation will have adequate notice, rights of appeal, and other legal safeguards to encourage full compliance.

## A. Agency Selection

Many existing agencies with responsibilities in the water quality management area should be considered when arranging regulatory responsibilities for specific pollution sources. In addition to various State and local agencies, it may be possible to utilize regional agencies. For the regulation of point sources, these agencies may include state air and water pollution control organizations, natural resource departments, public health agencies or institutions responsible for the NPDES program. Regional and local agencies might include governments of general jurisdiction, sewage treatment agencies, or special district authorities. For nonpoint source regulation, agencies might include Soil Conservation Districts, State agricultural and forestry agencies, State land management bureaus, and State soil and water conservation agencies.

## B. Statutory Requirements

The Act requires that a regulatory program include the following:

1. To the extent practicable, provide for waste treatment management on an areawide basis and for identification, evaluation and control or treatment of all point and nonpoint pollution sources;

2. Regulate the location, modification, and construction of any facilities within the area which may result in any discharge in such area;

3. Assure that industrial or commercial wastes discharged into any treatment works in the area meet applicable pretreatment requirements.

The regulatory program is also affected by Sec. 208(b)(2)(F-K) which requires that water quality management plans: 1) set forth procedures and methods (including land use requirements) to control to the extent feasible nonpoint pollution sources related to agriculture, silviculture, mining, and construction; and 2) establish processes to protect ground and surface water quality through controls on disposition of residual wastes and on land disposal of pollutants.

To meet the requirements of the Act, the implementing agency(s) will need clear, explicit and overall authority for their regulatory activities. They should not assume that the authority is implicit or inherent in existing law. In some cases, the authority necessary for some of the regulatory tasks may be present in governmental entities, or combinations of them, to be included in the management arrangements. In other cases, additional authority may be necessary to carry out specific regulatory responsibilities. This may require a delegation of authority from other state or federal agencies or new state legislative enactments. It may be possible to acquire necessary regulatory authority by amending existing legislation. Instead of enacting new legislation or amending existing laws, it may be advisable to include in the institutional arrangements, agencies which already have the needed authority but may not normally be involved in water pollution control. Examples of such agencies would include those with regulatory power over land use and construction activity.

### C. Regulatory Controls

The regulatory controls are the specific measures used to regulate a pollution source. There are several general forms of regulation which may be used individually, or in combination, for regulatory purposes. Additional regulatory controls are discussed in Ch. 6.

1. Land Use. Many land use control measures could be used in a regulatory program. These include:

   - authority over the use and development of public lands;
   - soil conservation measures;
   - flood plain or other critical area controls;
   - zoning or subdivision controls exercised by local governments in collaboration with the state water quality program

2. Permits and Licenses. It is often possible to create permit and/or licenses to accomplish many water quality management goals:

   - NPDES permits may be issued with effluent standards that assure desired water quality;
   - pretreatment permits may be required for effluents entering wastewater treatment facilities to assure desired water quality;
   - permits for other point sources; or permits and licenses for activities generating nonpoint source pollution, may specify criteria for siting, design, and performance of facilities and operations.

The effectiveness of any permit program depends upon the availability of sanctions and adequate staffing. It is important that planning agencies give careful attention to providing adequate sanctions for the program and to assuring the availability of resources necessary to implement them.

3. Standards. State water pollution control agencies have the ability to create or to modify water quality standards. State agencies may set water quality standards at more stringent levels than the national guidelines in order to implement antidegradation policies. Like the use of permits for regulatory purposes, the effectiveness of the program depends upon the availability and use of effective sanctions for noncompliance and adequate staffing.

4. Fiscal Policies. Various fiscal policies, such as taxation and pricing, may be used to complement the regulatory program.

a. Pricing Policy

Pricing policy can be used to reduce the flow of wastewater through metering. In this regard, there are two decisions which must be made. The first, for many areas, is whether or not to meter. Unless there are meters, charges cannot be be assessed for incremental use, and therefore a pricing policy cannot affect flow and waste reduction. Savings from a reduction in water and wastewater flow must be balanced against the costs of metering. Relevant savings and costs apply to both the water and waste treatment systems.

If a decision is made to meter, or to meter certain classes of users, the second decision is to determine the rate levels. To encourage cost-effective choices on the part of users, economic analysis indicates that at the margin of use, rates should equal marginal costs. Rates should reflect the incremental cost attributable to flow, the incremental cost of BOD removal, etc.

In practice, and in current guidelines, the emphasis on developing user charges has been on identifying average costs attributable to flow removal of BOD or other constituents. While rates based on such estimates are not ideal, they have been effective in inducing wastewater flow reduction and industrial process change.

### b. Taxation Policy

Differential assessment ratios can serve as an inducement to keep land in a nonurban classifiaction for open space or low density. Such a policy permits owners to maintain land in its present use, but does not prohibit its sale for a more intensive use at a later date. The policy therefore tends to slow down the rate of development, without completely prohibiting it, but gives no assurance that the most environmentally sensitive areas are given the most protection.

Other taxation policies should also be considered. For example, sales tax exemptions, property tax exemptions, and tax deductions can be used to pay or subsidize private dischargers to encourage process changes to lower the generation of pollutants.

### c. Public Investment Policy

The waste treatment facilities elements of the plan will have a direct relationship with public investment policy. The provision of sewerage service is one of the more important public investment decisions an area can make. Careful consideration must be given to ensuring that other public investment policies and decisions are consistent with the plan. Most important among these are transportation, water supply, and public facilities. In developing the plan it is necessary to ensure that areas scheduled to be sewered also receive other necessary public facilities and services. Decisions about public investments can be made to reinforce the plan and, in particular, the regulatory program. For example, areas that are to be moderately developed should have a transportation system adequate for that level but not for extensive development.

## D. Technical Requirements

To determine whether compliance with a regulatory program is being achieved, the program should include a specification of the type of pollutant to be regulated from each pollution source and the level of control which is sought. The regulatory goal should be clearly understood by those responsible for assuring compliance and those regulated by the program. A more detailed discussion of technical requirements may be found in Chapters 3.6, 6, 7, 8, 9, 10.

### E. Procedural Requirements

The regulatory program should incorporate adequate compliance proecdures and arrangements to protect the interest of those affected by the program. The procedural arrangements in the program should include at least the following:

1. A procedure for giving adequate notice to those regulated by the plan concerning when, where, and how the regulation will apply to them.

2. Information to regulated parties specifying how they are expected to conform to the regulatory program.

3. A method for hearing and responding to grievances among those affected by regulation.

4. A notice and hearing procedure for major regulatory decisions made by the management agency(s).

5. Provisions for public participation in the administration of the regulatory program.

In order to devise an effective regulatory strategy, it may be useful to take an inventory of existing regulation for each pollutant source category. Based upon an assessment of the adequacy of existing regulation to deal with each pollutant problem, necessary modifications of existing regulatory approaches can be proposed. The need for additional legislation to establish adequate regulation of pollution sources should be assessed as early as possible in the planning process so that action may be taken to obtain the necessary regulatory authority.

## 9.4 Waste Treatment Management Program

A waste treatment management program consists of all those activities necessary to create, operate, finance, and enforce the waste treatment provisions of the State WQM Plan. It is particularly important that management agency(s) obtain the required authority for these tasks as described in Section 208(c)(2) of the Act and that they develop effective management strategies for implementing these responsibilities. Management agencies should not rely upon implied powers for their authority but should obtain explicit authority for their tasks. It is very likely that some of the required authority will not be possessed by management agency(s) when planning begins and will have to be explicitly obtained before the management phase begins. The waste treatment management tasks include all of those mentioned below.

A. Securing Comprehensive Authority

Section 208(c)(2)(A) requires that there be adequate authority "to carry out appropriate portions of an areawide waste treatment management plan..." The tasks for which this authority is needed are described in Sec. 208(b). Usually, this authority will be distributed among several agencies in the 208 area. An important planning task is to allocate, and sometimes to consolidate, this authority among those units responsible for the management program. The plan must identify agencies necessary to carry out the plan.

Section 208(c)(2)(B) requires that there be adequate authority to "manage effectively waste treatment works and related facilities..." in conformance with the plan. In this regard, the broad definition of "treatment works" set forth in Sec. 212(2)(B) and discussed in Chapter 8 should be kept in mind. Institutional arrangements must incorporate some means of coordination among the agencies involved in administering the plan so that conflicts can be resolved and the plan properly enforced.

B. Operations Management

The Act requires in Section 208(c)(2)(C) that there be adequate authority "directly or by contract, to design and construct new works, and to operate and maintain new and existing works as required by (the) plan..." Generally, existing waste treatment agencies already have this authority. However, where works are to be located outside the immediate jurisdiction, or when discharges from outside the immediate jurisdiction are to be accepted, adequate enabling legislation to meet this requirement may have to be enacted. When approval of a superior agency is required, it should be secured before a construction grant application is made. The management plan should provide sufficient manpower, fiscal resources, and administrative expertise to assure that the customary management tasks associated with such a waste treatment operation are properly discharged.

C. Financing

The Act requires in Section 208(c)(2)(D) that there shall be adequate authority "to accept and utilize grants, or other funds from any source for waste treatment management purposes." Most waste treatment agencies have this authority under state law. Where such authority does not exist, enabling legislation must be passed. Some States have arrangements permitting State agencies to redistribute grants among local government units, but the Act requires that the full federal share of funding for treatment agencies be distributed to the local units.

Section 208(c)(2)(E-G) deals with other authority required in relation to financial arrangements. It should be noted that Sec. 204(b)(1)(A) and (B) require that all user charge arrangements must assure that each user pay his proportionate share of service costs and that there be full industrial cost recovery in the program. Many existing arrangements for assessing user charges are not likely to meet these tests. See Chapter 10 for a discussion of user charges.

In addition to these specific statutory requirements, the management agency(s) must be prepared to deal with the customary fiscal responsibilities for program management, including the raising and transfer of funds internally, and the apportionment of responsibility for financing operating costs of the program among the constituent units.

### D. Sanctions

An effective waste treatment program includes sanctions. Section 208(c)(2)(H) requires that there be adequate authority "to refuse to receive any wastes from any municipality or subdivision thereof, which does not comply with any provisions of (the) approved plan..." This authority, which may be exercised by an appropriate state agency, would be used only in extreme cases, and only if such measures as negotiations, fines, additional charges, moratoria, and court settlements have proven unsuccessful.

The Act also requires in Sec. 208(c)(2)(I) that there be adequate authority "to accept for treatment industrial wastes." This authority also extends to refusal of wastes which do not meet applicable pretreatment requirements as mentioned in Sec. 208(b)(2)(C)(iii). Other grounds for refusal exist when an industry does not comply with the State WQM Plan or violates applicable State or federal discharge laws.

## 9.5 Basic Issues in Management Agency Designation

Many issues will have to be resolved to determine the management agency(s) and institutional arrangements necessary to meet the requirements of the Act. The basic issues are:

1. What agency will exercise responsibility for overall program supervision and enforcement?

2. To what extent will the affected local governments be involved in the management arrangements?

3. Will implementation responsibility be vested in a single agency or diverse agencies?

4. What will be the relationship between the management agency(s) implementing the State WQM Plan and those agency(s) implementing portions of the State WQM Plan in designated 208 areas?

5. If consolidation of agency responsibilities is undertaken, how will this be accomplished?

6. What decisions will be taken to assure that local land use decisions do not adversely affect water quality?

7. To what degree will agencies be supported from tax revenue?

Attached (page 9-11) is a chart which suggests where responsibility for major elements of plan implementation might be located.

## A. Options in Institutional Arrangements

The choice of the agency(s) to implement the State WQM Plan will probably be influenced by the number of governmental units which possess or can secure the authority to manage the waste treatment program and to implement the regulatory aspects of the State WQM Plan. Generally, there are several approaches to consider:

### 1. Single Planning and Implementing Agency for Each Planning Area

One option is to establish a single planning and implementing agency for all the area included in the plan. This would facilitate greater coordination and continuity between planning and implementation than would be possible if these two responsibilities were assigned to separate entities. If this approach is taken, it is important to assure that the agency involved has sufficient statutory authority to carry out the requirements of both planning and implementation and that elected officials are included in the planning process. This option might be especially appropriate for carrying out State WQM Plans on public lands where a state or federal agency could assume both planning and implementation responsibility.

### 2. Single Planning and a Single Implementing Agency for Each Planning Area

Another option is to divide the planning and implementation responsibilities between two separate agencies. This would make day-to-day coordination more difficult, but might facilitate the implementation of the plan by requiring less reorganization of existing agency authorities than might otherwise be needed. Again, it is important that the planning agency have elected

## POSSIBLE LOCATION OF MAJOR RESPONSIBILITIES FOR MANAGEMENT ACTIVITIES

| | | Regional | | |
|---|---|---|---|---|
| Responsibilities | City/County | Representatives of General Purpose Government | Special Districts | State |
| General Management | | | | |
| --supervision/coordination | X | X | X | |
| --continuous planning | | X | | |
| --fiscal management | X | X | X | |
| Regulation | | | | |
| --land use and other land management controls | X | | | X |
| --permits and licenses | X | | X | X |
| --standards | | | | X |
| --fiscal policies | X | | X | X |
| Waste Management | | | | |
| --operations management | X | X | X | |
| --financing | X | X | X | |
| --sanctions | X | | | X |

officials on its Advisory Board. This option might be necessary if one agency conducted planning and another agency undertook implementation responsibilities for public lands.

### 3. Single Planning Agency and Plural Implementing Agencies for Each Planning Area

A third option would be a single planning agency and more than one management agency. The use of multiple implementing agencies might permit the gathering of sufficient authority and resources for plan management without consolidation or other reorganization of existing governmental bodies. While coordination between the planning agency and the management agencies would be more difficult, the plan might be more rapidly implemented. Economies of scale in plan implementation, however, would not be likely due to fragmentation. Two approaches to securing supervision and enforcement in plan implementation should be considered:

a. A single supervisory agency with clear responsibility and resources for overall management, coordination, and plan enforcement.

b. Apportionment of some responsibilities for plan supervision and enforcement among several agencies with one given the lead role.

The advantage of fixing responsibility for supervision and enforcement of the plan upon a single agency is clear accountability and greater coherence in conflict resolution, plan coordination, and overall management activities. Dividing responsibility for program supervision and coordination among several agencies while designating one as the lead agency may disturb existing agency powers and relationships less and reduce the difficulties of formulating a satisfactory management scheme.

### 4. Role of the State in Planning and Implementation under Options Presented Above

For each planning area, the State may delegate both planning and implementation responsibilities. However, if planning responsibilities are delegated, a lead planning agency should be designated in each planning area. Under any of the options discussed above, the State is ulimately responsible for assuring plan implementation.

## B. Intergovernmental Agreements

No matter which of the above options is chosen, formal intergovernmental agreements must be made. Adjustments in the authority and in services of local, regional, or state governments in a State WQM area may be effected by different forms of legal agreement and statutory authorization.

### 1. Contract

Where a single agency already encompasses the entire §208 area, other participating local units (county, metropolitan government, or metropolitan special district, etc.) of government may contract with it to provide the services required.

### 2. Joint Exercise of Powers

Where they do not already exist, consolidated agencies may be established jointly by the participating local units of government. Interlocal contracts or agreements may be utilized in such joint exercise of powers.

### 3. Delegation of Responsibility

Where a new areawide agency is established, the State may transfer functions to it from other local, regional, or state agencies through appropriate enabling legislation.

## C. A-95 Review

In accordance with OMB (Office of Management and Budget) Circular A-95 Revised, dated November 13, 1973, all applicants under federal programs which provide assistance to state, local, and areawide projects and activities planned on a multijurisdictional basis must notify the appropriate state and areawide planning and development clearinghouse for review and comment. The proposed application will be reviewed for its consistency with areawide plans including comprehensive planning, environmental concerns, water supply and distribution systems, sewage facilities and waste treatment works, and land use. In most cases, either a regional planning agency or COG serves as the regional clearinghouse, and, as mentioned above, may be utilized as the areawide planning agency under §208. As part of its review responsibilities, the State should ensure that any part proposed applications are consistent with State WQM Plans. On the national level, EPA reviews the annual certification of State plans.

# CHAPTER 10

# FINANCIAL ARRANGEMENTS

## 10.1 Introduction

Financial planning must be an integral part of the planning process. The purpose of financial planning is to determine the methods and arrangements which management agency(s) can use to finance the implementation of a water quality management plan. A financial plan including a budget should be developed to describe the sources of financing for the three functions to be carried out by the management agency(s):

1. General management program, including program administration, supervision and coordination, and continuing planning;

2. Regulatory program, including administrative activities and possible capital outlays involved in compensation of land owners affected by regulation;

3. Waste treatment management program, including planning, construction, operation and administration of municipal facilities and other public sector pollution control projects (including nonpoint source abatement projects).

In order to budget for these activities of management agency(s), it is useful to consider three types of costs that may be incurred in carrying out the activities:

- capital construction costs;
- operational costs and revenue;
- indirect (overhead) costs.

In developing a financial plan, it is useful to distinguish the activities in need of financing, the management agency(s) proposed to administer the element of a plan, and the possible means of financing the capital, operating, and indirect costs associated with that element of the plan. The following section discusses the requirements of the Act pertaining to three types of financing involved in carrying out a water quality management plan. The next section (Ch. 10.3) discusses how these requirements might be met in order to carry out management agency functions. The final section (Ch. 10.4) suggests information to include in a financial plan.

## 10.2 Requirements of the Act

Provisions directly and indirectly affecting financial arrangements are contained throughout the Act with those specifically affecting the State WQM Plan set forth in Title II.

## A. Capital Construction Costs

1. §208(b)(2)(E) requires that the water quality management plan include identification of the measures necessary to carry out the plan including financing and the costs of carrying out the plan within the necessary period of time. This applies to all capital costs associated with point and nonpoint source controls.

2. §204(a)(4) requires that the applicant proposing to construct treatment works agree to pay the non-Federal costs of such work.

3. §204(b)(1)(C) provides that the Administrator shall not approve any grant for any treatment works unless he shall first determine that the applicant has the financial capability to insure adequate construction, operation, and maintenance of the treatment works through the applicant's jurisdiction.

4. §208(c)(2)(C) requires that the waste treatment management agency(s) have adequate authority directly or by contract to design and construct new works and operate and maintain them.

5. §208(c)(2)(D) requires that waste treatment management agency(s) have adequate authority to accept and utilize grants or other funds from any source for waste treatment management purposes.

6. §208(c)(2)(F) requires that the waste treatment management agency(s) have adequate authority to incur short and long term indebtedness.

7. §204(b)(1)(B) provides that the Administrator shall not approve any grant for any treatment works unless the applicant has made provision for industrial cost recovery (recovery from industrial users of the portion of the Federal share of treatment works construction cost attributable to industrial waste treatment).

8. Section 12 of the Act provides for an Environmental Financing Authority under the Secretary of the Treasury. This Authority is established to assure that inability to borrow necessary funds on reasonable terms does not prevent state or local public bodies from carrying out waste treatment works construction projects eligible for assistance under the Act. The Authority is authorized to purchase the financial obligations of these public bodies to finance the non-Federal share of such construction.

## B. Operational Costs and Assessment of Revenue

1. §204(b)(1)(C) provides that the Administrator shall not approve any grant for any treatment works unless the applicant

has financial capability to insure operation and maintenance of the treatment works.

2. §208(c)(2)(E) provides that the waste treatment management agency(s) must have adequate authority to raise revenues, including the assessment of waste treatment charges, to implement all elements of the plan.

3. §208(c)(2)(G) provides that the waste treatment management agency(s) must have adequate authority to assure, in implementing waste treatment management plan, that each participating community pays its proportionate share of the treatment costs.

4. §204(b)(1)(A) provides that the Administrator shall not approve any grants for any treatment works unless the applicant has adopted a system of user charges assuring that each recipient of waste treatment services will pay its proportionate share of the cost of operation and maintenance (including replacement) of any waste treatment services provided by the applicant.

### C. Indirect (Overhead) Costs To Be Financed

1. Continuing planning is an indirect cost to be financed by the management agency. §208(b)(3) requires that the water quality management plan shall be certified annually by the governor of the state or his designee as being consistent with the applicable basin plan.

[illegible] §208(b)(2)(F)-(K) provide that the management plan shall include processes to identify and/or control nonpoint sources of pollution. Nonpoint source planning is an especially important part of continuing planning.

3. §201(e) provides that the Administrator shall encourage waste treatment management which results in integrating facilities for sewage treatment and recycling. It further provides that such integrated facilities shall be designed and operated to produce revenues in excess of capital and operation and maintenance costs and that such revenues shall be used by the designated regional management agency to aid in financing other environmental improvement programs.

## 10.3 Development of Financial Plans

### A. Capital Construction Costs

Capital costs will be incurred primarily in the construction of waste treatment systems. However, in some cases, fixed capital investment may be necessary in order to finance a regulatory program involving acquisition of land or compensation of landowners.

1. Waste Treatment Program

Due to the number and variety of methods for financing waste treatment under State and local laws, each plan should include the broad range of financial arrangements available rather than follow any rigid formula. Some requirements of the Act should present few if any difficulties with regard to financial arrangements for treatment of wastes; others are more likely to cause problems. Financial arrangements which should be relatively easy to provide are as follows:

a. Capital funds may be raised or generated from the general fund, particularly if the applicant is a government unit of general jurisdiction.

b. Capital funds may be generated from grants or funds from any other sources. In some instances, matching funds may be required.

c. The capacity and ability to contract indicates a limited ability to generate short-term indebtedness.

d. The capacity to incur short-term indebtedness may be demonstrated by the ability to issue bond anticipation notes, grant anticipation notes, or to borrow from state agencies. Such short term indebtedness must, of course, comply with constitutional limitations on borrowing and with any state or local statutory requirements.

e. The capacity to incur long-term debt may be demonstrated by the capacity to issue general obligation bonds, revenue bonds, or the capacity to borrow from state agencies. Exercise of this capacity to borrow is of course limited in many instances by constitutional or statutory provisions. There must also be compliance with state and local statutory requirements for the issuance of bonds or the incurring of such long-term indebtedness.

Areas in which problems may be encountered in complying with the Act include the following:

a. The industrial cost recovery requirements of the Act are specifically covered in 40 CFR 35 Subpart E, of the grant regulations. Industrial cost recovery charges may be allocated on a systemwide basis provided that the treatment works project for which the grant is made is substantially interconnected, with a goal to be completely interconnected physically to all other portions of the system.

Where revenue bonds are used to finance the local share of construction costs, funds designated for bond repayment should be accounted for separately from those received in compliance with industrial cost recovery requirements. This should avoid any problem in establishing priorities for repayment to revenue bond holders entitled to receive the industrial cost recovery share of total revenues. In instances where industrial users must make long-term commitments for repayment, provision might be made for transfer of this commitment, in order to facilitate industrial growth and change within the area. Since it is implied that a long-term commitment to repay is in exchange for provision of services to treat the user's industrial wastes, such rights to services should be transferable. Both the commitment and the right to services should be transferable, subject, however, to approval by the waste treatment management agency.

b. In the event of consolidation of two or more areas or agencies, each of which had incurred indebtedness and other contractual obligations in supplying waste treatment services, a legally acceptable method must be set forth for the consolidated agency to assume payment of the debts and obligations. Personnel contracts, retirement benefits, long-term supply contracts, etc., should be paid particular attention.

c. In the event of treatment system consolidation, problems may arise over the new waste treatment management agency reimbursing the participating agencies for the value of their existing facilities and assets. A fair and uniform method of determining the values of these assets and a legally acceptable method of handling the transfer should be set forth.

## 2. Regulatory Program

Capital outlays may be necessary in carrying out a regulatory program over existing and future waste discharge; such outlays might arise from land acquisition or compensation of landowners for reduction in the value of their land due to development restrictions. These expenditures may be financed through some of the financial arrangements discussed above--general funds, grants, or bonds. Capital expenditure for land acquisition could be considered as part of multi-objective programs such as programs for parks and recreation. Alternative means for defraying potential capital expenditures incurred by regulatory programs would include land dedication requirements and incentives in subdivision regulations, cluster zoning, planned unit development ordinances, and other self-financing schemes for encouraging land development that is compatible with environmental objectives.

## B. Operational Costs and Revenue Assessments

### 1. Waste Treatment Program

The Act provides two mechanisms for financing the operating costs of waste treatment facilities:

a. User charges. 40 CFR 35 Subpart E, and related guidelines provide the basis for establishing user charges. As set forth in these regulations and guidelines, the Act requires that each recipient of waste treatment services pay its proportionate share of costs of operation and maintenance. Charges based on property values only will not suffice to satisfy this requirement, except in cases where such charges have been used historically, change-over would be costly and disruptive, and the goal of proportionality among user classes can be achieved by such systems. Uniform rates on volume among classes of users will suffice if the classification reflects the differences in cost of treatment among classes of users.

b. Participating communities' proportionate shares. In determining each participating community's proportionate share of treatment costs, the differentials among communities should be explained and justified. In the event that all participating communities are charged on the same basis, justification should be given. The provisions and effects of interlocal agreements and contracts to supply waste treatment services should be reviewed and set forth. The methods of charging users within each of the participating communities should be defined. The user charge requirement cannot be avoided by interlocal agreements or contracts to supply waste treatment services. User charge requirements must be reflected in determining the participating communities' proportionate shares of treatment costs.

For pollution abatement projects not financed through the construction grants program of the FWPCAA (for example, nonpoint source abatement projects), the principle of effluent fees or user charges should also be followed for financing operating costs.

### 2. Regulatory Program

Locally established regulatory programs in which capital investments are incurred may also be financed through user charges. For example, if land is acquired for protection of critical or flood prone areas, recreational facilities on these lands could provide a source of revenue to defray capital and operating expenses of such projects.

## C. Indirect (Overhead) Costs

### 1. General Management Program

The overall management of State WQM Plan implementation, including continuing planning, program administration, supervision, and coordination, will necessitate specific sources of funding. The following are examples of some of the activities of a management program for which financing would be needed:

a. Program supervision and coordination:

- water quality monitoring and surveillance;
- development of revised work plans and State/EPA Agreement;
- performance evaluation for each planning area;
- determination of the need to revise elements of the plan and delegation of revision to regional, State, or Federal agencies;
- coordination with other planning programs;
- public participation in plan implementation.

b. Continuous planning:

- plan revision and updating;
- annual certification of plan.

c. Fiscal management:

- budget development;
- development of financial arrangements to implement plans;
- financial consulting with affected management agency(s) during plan implementation.

The possible sources of financing for the general management program might include general revenue, grants, bonds, and special taxes and assessments. Since water quality management provides specific services such as sewage treatment, nonpoint source pollution abatement (including protection of property from flood and erosion hazards), access to recreation opportunities, water supply protection, fish and wildlife conservation and many other benefits, the administrative costs for carrying out the State WQMP should be assessed to those benefiting from the services provided by plan implementation. Examples of financing mechanisms directed to users of these services would include: water and sewer charges, flood insurance premiums, portions of general taxes, recreational user fees, and hunting and fishing licenses.

## 10.4 Budget Preparation and Supporting Documentation

A. The plan must include a projection of costs of carrying out the plan. This projection should be over a 20-year period. The projection could distinguish between waste treatment, regulatory, and general management activities of the agency(s) designated to implement the plan. The projection could also break the costs of carrying out these activities into capital, operating, and indirect costs as appropriate. For each activity involved in plan implementation, the budget should indicate the specific form(s) of financing to be employed.

B. For activities and elements of the plan to be carried out in the first five years of plan implementation, a more detailed 5-year projection including capital improvement budgeting and cash flow should be provided. It should include start-up costs, carrying charges during the first years of operation and similar nonrecurring costs associated with plan implementation.

C. The method for obtaining budget approval for the 5-year capital improvement budget should be described, and should indicate the schedule for obtaining such approval.

D. Where an activity or element of the plan is to be financed by increased taxes, charges, unused bonding capacity, or other increased assessment through existing sources of financing, the budget should indicate the present and projected charges.

E. The legal authority of the agency(s) to undertake the financing necessary for plan implementation should be described in an opinion letter from the legal counsel for the agency(s). This opinion letter could also be prepared by counsel experts specialized in the field of bond financing and State and local taxation.

# CHAPTER 11

# COST ASSESSMENT CONSIDERATIONS

## 11.1 Introduction

The State Water Quality Management Plans are to include an estimate of the cost of carrying out the plan. The costs to be assessed should include capital, operating, administrative, and maintenance costs. These costs can usually be measured in monetary terms. Other costs, however, such as social, environmental and economic costs, may be more difficult to quantify, and may be described and evaluated in a more subjective way. Guidance on such evaluation is provided in Chapter 13.

In determining an estimate of the cost of carrying out the plan, cost estimates should be made for the following categories:

- municipal facilities;
- industrial facilities;
- nonpoint source control;
- urban and industrial stormwater systems;
- residual waste control;
- regulatory program;
- program management.

These cost assessments should be based on the best available data. For example, cost estimates for municipal facilities should be based on engineering plans, specifications, and detailed cost estimates when available. Cost estimates for other abatement measures should also be based on engineering designs and specifications to the extent that such details are available in the descriptions of proposed abatement measures. Program management costs for carrying out these plan elements should be distinguished by plan element or as a separate category of administrative costs. Where the proposed abatement measures are only described in general terms, a general estimate of their cost should be undertaken (see Chapter 11.4). In addition, emphasis should be placed on the cost estimates for plan elements to be implemented in the first five years of the planning period. Due to a number of factors, including changes in economic forecasts and population projections, cost estimates beyond five years will be less accurate. Greater attention, therefore, should be given to refining the accuracy of the estimates for the initial five years.

## 11.2 Basic Concepts in Estimating Costs

### A. Economic Cost

In considering the cost of implementing a plan, it is necessary to distinguish between outlays and economic cost. In many instances cash outlays adequately represent costs, but sometimes a resource is used, with no cash outlay. The cost in such a case is the value of the resource in its best alternative use -- its "opportunity cost." For example, acquiring public land for a treatment plant may involve no cash outlay, but may have an opportunity cost in terms of foregone recreation or commercial use. If opportunity costs are not considered, plan selection will be biased towards those options which do not require outlays, despite their other costs. Moreover, the concept of opportunity cost accounts for the cost to the community and Nation as a whole, not merely the cost to one part or another.

### B. Price Levels

Where costs are estimated for future periods, they should be stated in terms of base period dollars. Future costs should not reflect any expected overall increase in wages and prices, unless there is reason to expect significant changes in relative prices during the planning period. For example, due to the present energy shortage, long term prospects are for higher energy costs. While it is difficult to predict how much costs will rise, alternative plans should be tested for the effect of higher energy costs.

### C. Interest Rates

Discounting is a way to account for the opportunity cost of funds invested in a project, in the sense that the funds could also have been used productively in the private sector of the economy or in some other public project. The applicable discount rate determines the optimal choice between capital expenditures now versus higher operating costs in the future, the optimal amount of reserve capacity to build, and so on.

In discounting, the costs of a plan are stated in terms of their present values. That is, future costs are discounted at an applicable rate of interest back to some intial starting date, and added to the initial capital costs. Alternatively, the present values may be converted into equivalent annualized values. Standard procedures are described in engineering, economics, and business finance texts.

The interest rate to be used in evaluating water-related public projects is prescribed by the Water Resources Council, a Federal inter-departmental group, in its "Principles and Standards for Planning Water and Related Land Resources", as amended by P.L. 93-251 (1974). The rate specified by the Council is based on the interest rate on Federal Securities with maturities of 15 years or more. The rate to be used for each fiscal year is determined by the Council on July 1. For fiscal year 1976, the rate is 6 1/8%.

## 11.3 Specific Cost Questions

### A. Sunk Costs and Salvage Values

Sunk costs and salvage values refer to capital assets in existence at the beginning or end of a program.

Sunk Costs. For simplicity, investments and cost commitments made prior to or concurrent with the planning study are regarded as sunk costs and are not included in the cost estimate. Such investments and costs commitments include, for example: (1) investments in existing wastewater treatment facilities and associated lands to be incorporated into a plan; (2) outstanding bond indebtedness. However, if inherited assets were to be disposed of -- for instance, a small treatment plant scrapped and the land sold -- their sale value would be treated as a credit to that plan.

Salvage Value. At the end of the planning period, land for treatment works (including that used as part of the treatment process or for ultimate disposal or residues), should be assumed to have a salvage value equal to its market value at the time of the analysis, less any costs required to restore the lands to pre-project conditions. Salvage value of land reclaimed by land treatment of sludge disposal should be estimated as the value of the reclaimed land. Rights-of-way and easements should be assigned a salvage value not greater than the market value at the time of the analysis.

Permanent structures should be assumed to have a salvage value at the end of the planning period if those structures can be expected to continue fulfilling their planned use. Salvage value should be based on the remaining functional life of the structure using a straight line depreciation over the assumed functional life of the structure. The same approach applies to process and auxiliary equipment that will have usable value at the end of the planning period.

### B. Capital and Operating Costs

Elements of total cost include capital construction cost, annual operation and maintenance costs, and equipment replacement costs.

As set out in EPA cost-effectiveness guidelines (40 CFR 35), capital costs for facilities include: cost of land, relocation and right-of-way and easement acquisition; design engineering, field exploration, and engineering services during construction; contractors' costs, including overhead and profit; administrative and legal services, including cost of bond sales; and startup costs such as operator training. Contingency allowances consistent with the level of complexity and detail of the cost estimate are also included.

The capital costs of a plan would include those incurred by both public agencies and private parties. Treatment facilities built by industrial companies for direct discharges or for pretreatment would be included in private costs.

Where waste and flow reduction measures are carried out by a large number of industrial and household dischargers, it is difficult to estimate the private costs. Unless the costs have a bearing on the choice of a cost-effective plan, such estimates are unnecessary.

Annual operating and maintenance costs for each alternate plan must be established. These costs should be adequate to ensure effective and dependable operation and should include all costs for operating and maintaining the facilities under study including power, labor, parts, materials, overhead, chemicals and repair or replacement of equipment and structures.

Cost-effectiveness analysis requires establishing a service life for each component and salvage values for components having service lives longer than the planning period. The following service lives are to be used, unless other periods can be justified:

| | |
|---|---|
| Land | Permanent |
| Structures | 30-50 years |
| Process Equipment | 15-30 years |
| Auxiliary Equipment | 10-15 years |

## C. Administrative Costs

Water quality planning and management are likely to include a number of ongoing costs for activities not always associated with sewage facilities management. These activities include monitoring of streams, monitoring the waste characteristics of major industrial dischargers, periodic checks of infiltration and inflow, records of storm and runoff characteristics, collecting and analyzing data on residential water use, continuing planning, coordination with other planning, public participation, and other program management responsibilities. These functions are as important to the effectiveness of a plan as the physical units in place. The costs should be included in financial projections. Recovery of costs by direct charges -- e.g., permit fees, monitoring fees, etc. -- should be considered and evaluated.

## D. Accuracy of Cost Estimates

The accuracy of cost estimates for all point and nonpoint elements of the plans should be sufficient to assure the selection of the most cost-effective solution.

The cost estimates should be sufficiently refined to provide a basis for the 5-year financial budget discussed in Chapter 10. Such estimates might be based upon preliminary engineering layouts and designs, taking account of facilities in place. As discussed in Chapter 10, financial budgets should cover the first five years; therefore, the level of detail for cost estimates should be greater for that period.

### E. Present Values

Using the interest rate discussed in 11.2.C., the costs for construction and operations, by year, should be discounted to the proposed plan initiation date, to obtain the present value (or, what is much the same thing, the annualized value) of the plan. An example is given in EPA Guidance for Facilities Planning, May, 1975.

## 11.4 Generalized Cost Estimation

As explained in Chapter 3.3.C, in some cases there may be good reason to develop particular plan elements at a more general level of detail than would be needed if that element were to be immediately implemented. In such cases, a generalized cost estimate for abating particular forms of pollution would be sufficient. The following guidance discusses methods for undertaking generalized cost estimates.

For some cost categories, such as for municipal facilities, there are recognized methods of cost estimation. For other categories, such as non-point source control, estimating procedures are not as well developed. All of the categories listed in the introduction to this chapter are discussed below. More definitive guidance can be provided for those categories where more recognized cost estimation procedures exist.

### A. Municipal Facilities Needs

Where facilities or areawide planning is in progress, the required cost effective analyses can be used in cost estimation. For specific facilities, the best sources are proposed contract costs from completed plans and specifications. At a less advanced stage in facilities planning, cost estimates based on firm or preliminary engineering estimates, and costs of recently constructed facilities of a similar nature should be used when available.

In the absence of completed facilities or areawide plans and firm or preliminary engineering estimates, a cost estimation procedure must be used. The generalized estimate of costs resulting from the State WQM Plan does not constitute a final decision governing facilities planning efforts. Rather, they represent the best estimate for the future project to be used in the absence of better estimates.

The treatment of wastewaters from various collection systems at a single treatment facility can take advantage of the economies of a large scale operation. Generally, justification of regionalization requires a detailed analysis. The time for such an analysis probably will not be available in the context of a preliminary cost estimate. If the need for several facilities in a limited area strongly suggests a centralized treatment plant, then this possibility should be reflected in the cost estimates. This option may not be evident at the local level; therefore, decisions may have to be made at the basin level.

## B. Industrial Facilities Needs

A generalized cost estimate for treating industrial wastes discharged to a municipal system should be included in the estimate of municipal needs. In those cases where industrial wastes are treated and discharged directly to receiving waters, an estimate of the cost should be included in the plan. Similarly, the plan should identify pretreatment costs borne by industry.

In many instances, it will be difficult to estimate industrial costs due to uncertainty as to the type of industry that might locate in the planning area. The cost estimate should be based on the best estimate of industrial growth and the types of industries likely to locate in the area. Estimates of the volume and nature of the wastes should take into consideration estimates of future processing and control methods. Information on the range and average treatment costs for particular industries in available in the Economic Analysis series developed by EPA for Proposed Effluent Guidelines for various industrial categories.

## C. Nonpoint Source and Residual Waste Control Needs

Cost estimates of nonpoint source and residual waste control needs should include estimates of cost for both structural and nonstructural control measures. Costs associated with structural measures include land acquisition and construction of facilities. Nonstructural costs include staffing, administration of programs, and costs of compensation of landowners (if required) affected by regulatory measures.

The cost of existing programs in the planning area, elsewhere in the State, or in other States can serve as a basis for cost estimation. Recent studies often provide information on abatement costs and can also serve as bases for estimates.

The cost estimates should be by agency and activity presented in 5-year increments over the planning period.

### D. Urban and Industrial Stormwater Systems

The cost estimates for urban and industrial stormwater systems should be disaggregated to show: (1) cost of required improvements to existing systems; and (2) cost of systems needed for areas not served, over at least the 20-year planning period (in 5-year increments). Included in the cost assessment for urban and industrial stormwater systems should be a generalized estimate of the effect on capital construction costs brought about by the use of nonstructural controls as well as capital and annual operating costs of such control programs. EPA is in the process of developing a cost estimation procedure for stormwater systems. The procedure should be available for use in Spring, 1976. If estimates are made using other procedures, a discussion of the chosen procedure and reasons for using it should be included with the cost estimate.

### E. Regulatory Program and Monitoring

Costs associated with a regulatory program include staffing, administration, and capital costs (e.g., land acquisition or landowner compensation). Many of the regulatory program costs will be the same as those included in the costs for nonpoint source control needs. For example, certain regulatory actions over silvicultural practices may be part of the plan. Where such actions could be listed as part of the nonpoint source control or as part of the regulatory program, the cost estimates should be included with the nonpoint source control needs.

As was the case with nonpoint source controls, cost estimates should be based on data from existing programs, where available. Data from programs in other States may be used but should be adjusted to reflect differences in economic conditions.

### F. Program Management

Cost estimates for program management activities for those elements of the State WQM Plan for which generalized estimates are made should also be developed. Program management activities would include costs of monitoring, technical assistance, administration of regulatory programs, coordination with other planning activities, etc.

# CHAPTER 12
# TECHNIQUES FOR COORDINATION

## 12.1 Introduction

Water quality management is affected by broad policies concerning land use, regional development, and the many functional planning activities carried out in a State. As a result, it will be necessary to coordinate State WQM Plan development with related policies, planning activities and programs. Of particular importance are those related programs listed in §130.34. Included in Chapter 2 is a discussion of the requirements for coordination. This chapter outlines techniques for coordination and describes how they may be integrated into the planning process.

## 12.2 Coordination Techniques

### A. Planning Agency Designation

In many instances, agencies which may be designated by the governor to be responsible for preparing and coordinating State WQM Plans will also be responsible for other related programs. Such programs may include air quality management, land use planning, coastal zone management, water supply, solid waste management etc. In making designations, governors should take into consideration other related activities of the agencies to be designated. Coordination between related programs can be improved when responsibility for the programs is lodged in the same agency.

### B. Planning Area Designation -- Geographic Boundaries

As discussed in Chapter 2, planning area selection can be based on hydrologic boundaries or political boundaries, or a combination of these. Whichever approach is chosen, consideration should also be given to other programs in the area. For example, an area may be involved in Air Quality Maintenance Area (AQMA) Planning. In determining the State WQM boundaries, it may be possible to overlap considerably with the AQMA boundaries. As discussed below, this could facilitate the development of integrated work plans and use of common data bases. While it will be very difficult to make boundaries coterminous, it may be possible to achieve a considerable overlap. In deciding upon planning area boundaries, major planning activities and programs should be reviewed to determine if boundaries can be designed to coincide with those of other programs.

### C. State/EPA Agreement

The State/EPA agreement on level of detail and timing is, in effect, a work program for the State WQM Plan effort. An agreement should be drawn up for each basin or approved planning area. The agreement will set forth specific responsibilities and tasks needed to carry out the State WQM Plan. Some of the tasks will be identical or similar to those carried out under other programs. This is especially true of data collection and projection of population, land use, and economic conditions. State WQM Plans should utilize applicable information and analyses from other programs and should identify this in the State/EPA Agreement. Similarly, the planning agencies will be producing outputs that other programs can use. This, too, should be identified in the agreement. In some cases, it will be possible to carry out tasks jointly with other programs, especially data collection, projection, and analysis. To the extent possible, specific tasks that will be coordinated should be identified in the agreement. Coordination with other programs will be easier if specific responsibilities are identified early and agreed upon.

## D. Intergovernmental Agreements

After defining specific responsibilities and tasks, intergovernmental agreements should be made to establish the responsibilities formally. Such agreements may include contractual relationships, memoranda of understanding, joint exercise of powers, and/or delegation of responsibility. These are discussed with respect to plan implementation in Chapter 9.

## E. Data

The data which will be needed to prepare a State WQM Plan will be similar or identical to that needed or produced in other plans. This is especially true of the population, economic, land use and air and water quality data. The coordination between plans can be greatly enhanced if consistent data bases and projections are used. To ensure such consistency, it is often helpful if a common classification system is used so that data can be compiled using a similar format. Planning agencies should integrate their data requirements before gathering data, so that information is transferable.

The feasibility of coordinating data collection and projection depends on the timing of the planning efforts. If one is done much earlier than others, more recent or comprehensive data may become available by the time the latter planning effort is underway. If this is the case, there may be adequate reason for modifying data and projections.

Another problem develops when the planning areas overlap but are not identical. In this case the projections in the overlapping areas should be the same and those for the adjacent areas should not conflict. That is, the growth rates for the entire area should be consistent.

Predictions of pollution levels will be based in part on population projections. These predictions will affect the selection of alternative implementation strategies, which could in turn, necessitate modification of the projections. This iterative process of revising projections must also be coordinated so that conflicts do not arise.

## F. Representation

Periodic consultation between agencies responsible for planning will help ensure that plans are consistent. It is important, therefore, that representatives of the planning agencies responsible for various programs be included in any advisory group which might be created to ensure periodic consultation between the agencies. The Part 130 regulations require the establishment of at least one policy advisory committee. Representatives of programs with a major relationship to the State WQM Plan should be members of any advisory committees which are used. In addition, the staffs of the planning agencies should develop a close working relationship. For example, each agency could designate specific individuals to serve as liaison to help ensure that necessary coordination is carried out in a timely fashion. This would also help in identifying possible conflicts and resolving them informally as they arise.

## G. Evaluation of Alternative Strategies

Many of the management strategies which will be adopted as a result of State WQM Planning will have an impact on other programs. The strategies resulting from other programs may affect the development of State WQM Plans. It is important, therefore, that the evaluation of alternative strategies include an analysis of impacts on the activities of related programs. This is especially true of other environmental programs, in particular those dealing with air quality. Many of the measures incorporated in State WQM Plans to control point and nonpoint sources affect land use which could, in turn, affect air quality. For example, sewer interceptor and facilities location, restricting the location of industrial development to areas where the receiving waters have assimilative capacity, and restricting development in areas where significant nonpoint pollution would result, are decisions which could affect air quality. However, not all interaction between State WQM Plans and air quality plans need result in conflict. Both plans, for example, should favor better management of construction activities. Measures such as minimal exposure periods for active construction areas, or utilization of staged grading, seeding and sodding procedures would reduce both runoff and fugitive dust problems. In general, State WQM Plans should take advantage of complementary strategies by evaluating the effectiveness of various alternatives to determine their impact on other related programs.

The planning agencies should make sure that they inform one another about alternatives being considered and offer one another an opportunity to review and comment on alternatives. Such comments should be considered during the evaluation process so that alternatives for one program could not be selected that would conflict with implementation of the plans for other programs. This review and comment should be undertaken by the planning staffs and the advisory groups to the planning agencies.

### H. Reporting

In order to keep the various planning agencies posted on current developments, there should be some type of periodic or milepost reporting. This could take place quarterly or at the beginning and completion of some subtask (e.g., data collection, projections, analysis of water and air quality, etc.). Informal contacts would, of course, be more frequent. Periodic or milepost reporting, however, would provide formal documentation of the communication which had taken place.

In addition, a report should be periodically sent to the EPA regional office. The report should describe how representatives of related programs are involved in an advisory capacity, any major meetings which have been held, what information has been provided to each program, how consistency in data and projections is being achieved, and any potential conflicts which may develop. This should be done at a minimum of every 3 months in the format of the quarterly interim progress reports.

### I. Resolving Conflicts

If potential conflicts arise during plan development, it is expected that the planning agencies responsible will attempt to resolve them informally. If this is not possible, in designated areas the conflict should be referred up to the State level where the agencies responsible for administering the respective programs would resolve it. As a final resort, conflicts should be referred to the Regional Administrator for mediation.

In the case that other federal agencies were involved in a dispute, then EPA should meet with representatives of the affected agency to review the situation and whenever possible to formulate recommendations for resolving the dispute.

## J. Program Approval

After completion, the planning agencies responsible for related programs should review each other's plans to ensure that there are no conflicts. If the agencies have been involved in plan development, no conflicts should arise when it comes time to review the plan. In its review, EPA will evaluate the consistency of the State WQM Plan with other programs. Comments provided by the agencies responsible for the programs will be a major input to EPA's review.

## K. Procedures for Coordination of Planning Programs

EPA has developed agreements and memoranda of understanding concerning coordination of a number of planning programs that affect water quality management planning. These agreements and memoranda utilize many of the plan coordination approaches discussed in this chapter. However, greater detail on coordinating particular aspects of each program with water quality planning may be found in the following:

- Interagency agreement to relate HUD 701 planning and EPA 208 planning, March 24, 1975.
- Integrating 208 Planning and 701 Comprehensive Planning. Program Guidance Memorandum AM-9, May 2, 1975.
- Coordination of EPA Water Programs and Coastal Zone Management Programs. Program Guidance Memorandum AM-11, September 29, 1975.
- Coordinating 208 Planning and Air Quality Maintenance Area Planning. Program Guidance Memorandum AM-14, October 30, 1975.
- Joint agreement for interagency coordination of areawide waste treatment management planning assistance to state and local governments between the Environmental Protection Agency and the Department of the Army, November 22, 1974.

# CHAPTER 13

# ENVIRONMENTAL, SOCIAL AND ECONOMIC IMPACT EVALUATION

## 13.1 Purpose

This chapter provides guidance for integrating environmental, social, and economic impact evaluation into the planning process. It is intended to meet, in part, the requirements of Sec. 102(2)(c) of the National Environmental Policy Act of 1969 and regulations issued pursuant to that Act. It is also intended to meet the requirements of Sec. 208(b)(2)(E) which requires "the identification of the economic, social, and environmental impact of carrying out the plan...."

The evaluation must be viewed as an integral part of the planning process. As such, it will be performed throughout the process rather than after the selection of the plan, with citizens and local units of government afforded the opportunity to participate in impact evaluation from the beginning of the planning process. Affected citizens and units of government will thus be better able to analyze the various alternatives, to identify specific plan impacts, and to provide meaningful suggestions and recommendations.

## 13.2 Environmental, Social and Economic Impact Evaluation Process

### A. Inventory Existing Conditions

The purpose of inventorying existing conditions is twofold: (1) to aid in goal and problem identification; and (2) to serve as a basis for the analysis and comparison of alternatives. At a minimum, the inventory should encompass the planning area and other areas that would be affected by the plan. For example, land disposal sites for effluent or sludge, other wastewater reuse sites, and the down-stream river corridor that would be affected by effective water quality management should be included. The inventory will undoubtedly require additions as new problem areas are identified in the planning process.

Most of the data needed for the inventory will be readily available in existing documents and may have been gathered for use elsewhere in the planning process. This would be true, for example, for most of the population, land use, and hydrological data. Additionally, items four through fourteen in the inventory (p.3-2) are impact categories which may be used in the plan selection process (Chapter 14) to determine differences among the plan alternatives.

Only that data which is relevant to the analysis of alternatives or determination of impacts should be included. Thus, the inventory may include but not necessarily be limited to the following:

1. Climate and precipitation;
2. Topography;
3. Geology;
4. Hydrology (surface and groundwater):
    a. water quality
    b. water quantity
    c. water quality and quantity problems
    d. water uses
    e. water quality management
    f. flood hazards;
5. Biology:
    a. rare and endangered species
    b. fish, shellfish and wildlife habitats including nursery and spawning areas
    c. fish, shellfish and wildlife community
    d. benthic community structure
6. Air quality;
7. Land uses:
    a. existing land uses
    b. land use planning and controls
    c. amount, type, and intensity of growth (The growth data should be of recent origin. There is no necessity to examine growth trends further back than 1960).
    d. soil types, permeability, and erodability
    e. significant environmentally sensitive areas;
8. Wastewater management resources:
    a. energy (power)
    b. chemicals
    c. land commitment;
9. Population levels:
    a. current
    b. projected (5, 10, 15, and 20 years);

10. Economic activity (gross assessment):

    a. income per capita
    b. agriculture
    c. mining
    d. manufacturing
    e. service;

11. Employment trends including regional availability of skilled manpower for treatment plant operation and monitoring;

12. Other local, state, and federal projects having major interaction with proposed water quality actions;

13. Public health;

14. Aesthetics:

    a. recreational accessibility and activities
    b. unique archeological, historical, scientific, and cultural areas
    c. noise pollution.

The inventory should also include identification of adopted goals and pertinent constraints. Goals might typically include:

1. Preservation of high quality surface water;

2. Preservation of coastal or other wetlands;

3. Preservation or enhancement of fish, shellfish and wildlife;

4. Enhancement of municipal services.

Examples of constraints include:

1. Air quality regulations and implementation plans;

2. Local climate, topography, soils, etc.;

3. Restrictions on flood plain use or other land uses.

## B. Evaluate the Existing Situation

Based upon the inventory, a brief analysis of the existing situation should be conducted to prioritize pollution problems and sensitive impact areas. This prioritization which will be a primary concern during the remainder of the evaluation will require participation of the public and local government agencies.

### C. Develop Baseline Projection

The inventory and evaluation of the existing situation will serve as inputs into the development of a baseline projection. Construction of a baseline projection of relevant environmental, social, and economic factors (see Table 14.1) will enable evaluation of each alternative. The baseline projections should be quantitative when data are readily available. In other cases, it should be qualitative. The baseline projection can be established by extrapolating present indicator trends over the planning period. In making this projection, it should be assumed that no additional water quality actions will be taken other than those that have already been approved.

### D. Screen Options and Subplans

Both point and nonpoint control options as well as continuous point source, intermittent point source, and nonpoint source subplans should be screened according to the factors set forth in Chapters 7 and 8.

### E. Evaluate Alternatives

After the alternatives have been developed, each of them should be evaluated by comparing its impact to the baseline projection. Special consideration should be given to those sensitive impact areas identified in the evaluation of the existing situation.

A complete environmental assessment of each alternative is not necessary, although the impact of both the structural and nonstructural aspects of the plan should be considered in every case. Table 14.1 contains a list of those environmental, social and economic factors believed to be generally most important. However, discretion should be employed when using this table. When there is no difference among alternatives, a statement to that effect is sufficient. Similarly, a statement will suffice when an alternative will have no perceptible impact on a given factor.

Special attention should be given to long-term impacts, irreversible impacts, and indirect impacts such as induced development. Resource and energy use associated with each alternative should also be highlighted. The results should be displayed in a format for use in public meetings and other forms of public participation.

## 13.3 Environmental Effects of the Selected Plan

The results of the environmental, social, and economic impact evaluation will be used in the plan selection process (Chapter 14). Once a plan has been selected, a complete description of the impact that the selected plan will have on the area's environment should be completed. The vast majority of the data required to do this should be readily available from the evaluations already performed. This more detailed evaluation should describe the impact of the proposed structural and nonstructural actions. Whenever possible, the impact of each action on each affected environmental, social, or economic category (see Table 14.1) should be described and displayed. However, if more than one action affects a category, the cumulative impact may be described. Impacts may be categorized as:

1. Primary (direct) or secondary (induced);
2. Beneficial or adverse;
3. Short or long term;
4. Avoidable or unavoidable;
5. Reversible or irreversible.

Included under irreversible impacts should be an evaluation of any irreversible commitments of resources including energy. (See §6.304 (c-f) of 40 CFR Part 6 for an explanation of these terms and examples.)

While emphasis should be given to the cumulative impacts of all elements of the plan, more localized impacts of specific plan elements, such as treatment plant locations, interceptor sewers, and industrial site locations, should also be assessed and highlighted when judged significant. Greater emphasis should be given to the localized impacts of individual projects anticipated to be developed during the initial five years of plan implementation.

# CHAPTER 14

## COMPARISON OF ALTERNATIVES AND SELECTION OF PLAN

### 14.1 Purpose

This chapter provides guidance on the comparison of alternative plans leading to the selection of a State water quality management plan. The process presented here assumes that each of the alternatives, if implemented, would meet all regulatory requirements and comply with appropriate goals and objectives within specified limits of technical reliability. Plans are to be compared in terms of the defined criteria of cost effectiveness as discussed in Chapter 1, feasibility of plan implementation, and public acceptability. Emphasis will also be placed upon drawing together the evaluations already completed so that the alternatives can be more easily discussed and compared. Finally, while public participation is necessary throughout the planning process, it is essential that the public be involved to a significant degree during this stage.

### 14.2 The Plan Selection Process

#### A. Assess Alternative Plans

No rigorous analytical method exists which will readily identify the best plan for the area. As discussed in previous chapters, many factors should be considered in comparing the alternatives. While some of the factors, in particular cost assessments, can be quantified, others can only be qualitatively assessed based upon professional judgement, and the views of the public. Plan assessment involves the comparison of all key factors deemed pertinent for reliable decision making. Table 14.1 contains a list of those which are believed to be generally most important. The inputs for that table are to be developed in the technical planning process (Chapter 3.8), the step at which alternative plans are evaluated in light of information on their cost, technical reliability, environmental, social and economic impact, implementation feasibility and public acceptability. The effects of the alternatives should be assessed quantitatively whenever possible. In all other cases a qualitative assessment should be made.

Representatives from all affected groups should be involved in the assessment of the alternative proposals. In most areas, affected groups would include conservation groups, economic interests, local elected officials, planning agencies, state departments of health, water pollution control, and natural resources, the regional office of EPA and the Policy Advisory Committee. The plan approval and implementation process will be more efficient if the people responsible for carrying it out fully understand the issues and contribute to the assessment and recommendation of alternatives.

## B. Develop Recommended Plan

Once the alternative plans have been assessed, the planning agency should be in a good position to compare the alternatives and develop a recommended plan. A logical approach for comparing the alternatives would be to identify initially that alternative which will achieve water quality objectives at minimum monetary cost. This least cost plan can serve as a base against which the increased costs and additional effects of other alternatives can be compared. The major environmental, social and economic impacts of this least cost plan should be listed, including a discussion of the institutional and financial issues that would be raised if the plan were recommended. Most of the required impact information should be contained in Table 14.1. A suggested format for displaying the least cost plan is shown in Table 14.2.

The next step should be the identification of the incremental monetary cost and incremental impacts of each of the remaining alternative plans in relation to the base plan. Information contained in Table 14.1 would provide the basis for this incremental evaluation. Description of alternatives should include the plan elements (such as construction, zoning, operations, etc.) and measures or statements of the changes in the impacts of those plan elements. In addition to the environmental, social, and economic impact and institutional and financial issues, additional benefits that could be gained or undesirable situations that could be avoided should be described. The alternatives should be described in such a way as to make comparisons with the additional costs required as direct as possible. The results may be summarized in the format of Table 14.3.

The planning agency should then conduct workshops for the elected officials who will be reviewing and commenting on the proposed plan to fully inform them of the consequences of implementing any of the alternative plans. The agency should also take note of their responses to the alternatives to see if the alternatives can be changed to improve plan acceptability. Since these workshops and the public hearings to follow could very well result in requirements for substantial changes in the design of plan elements and for further analysis of additional impacts, the agency should schedule resource expenditures to be able to respond fully to the need for additional modifications.

At the conclusion of the workshops, the planning agency should recommend a single plan. The plan elements, costs, impacts, and implementation issues can be summarized in the format shown in Table 14.2, accompanied by a brief report summarizing the process followed, the alternatives considered, and the criteria used to reach a final recommendation. The report and charts should be suitable for use at public hearings.

## C. Hold Public Hearings to Present Proposed Plan

The planning agency should conduct formal public hearings on the proposed plan and the alternatives considered in its development. The planning agency should then respond to the issues raised at the hearings and modify the proposed plan if appropriate (as judged by the agency). The planning agency will then submit the proposed plan to the appropriate governing bodies for review and recommendations.

## TABLE 14.1

## COSTS AND EFFECTS OF ALTERNATIVE PLANS

| | Alternative Plans | | |
|---|---|---|---|
| Significant Effects | P-1 | P-2 | P-3 |
| 1. Water Quality Goals | | | |
| A. Contribution to goals and objectives of the Act. | | | |
| B. Contributions to other water-related goals of the planning area. | | | |
| 2. Technical Reliability | | | |
| A. Frequency of plant upsets | | | |
| B. Frequency of spills | | | |
| C. Frequency and effects of combined sewer overflows | | | |
| D. Nonpoint source control | | | |
| E. Regional availability of skilled manpower for treatment plant operation and monitoring | | | |
| 3. Monetary Costs | | | |
| A. Capital costs including discounted deferred costs | | | |
| (1) public | | | |
| (2) private | | | |
| (3) total | | | |
| B. O.M. & R. Costs | | | |
| (1) public | | | |
| (2) private | | | |
| (3) total | | | |
| C. Net revenue (public) | | | |
| D. Overhead and plan management | | | |

## TABLE 14.1 (cont)

## COSTS AND EFFECTS OF ALTERNATIVE PLANS

| Significant Effects | Alternative Plans | | |
|---|---|---|---|
| | P-1 | P-2 | P-3 |
| E. Total average annual costs | | | |
| (1) public | | | |
| (2) private | | | |
| (3) total | | | |
| 4. Environmental Effects | | | |
| A. Hydrology (surface and groundwater) | | | |
| (1) water quality | | | |
| (2) water quantity | | | |
| (3) water quality and quantity problems | | | |
| (4) water uses | | | |
| (5) flood hazards | | | |
| B. Biology | | | |
| (1) rare and endangered species | | | |
| (2) fish, shellfish and wildlife habitats; including nursery and spawning areas | | | |
| (3) fish, shellfish and wildlife community | | | |
| (4) benthic community structure | | | |
| C. Air quality | | | |
| D. Land | | | |
| (1) change in land uses | | | |
| (2) land use planning and controls | | | |
| (3) amount, type and intensitv of growth (relate to land use) | | | |
| (4) soil erosion damage | | | |
| (5) significant environmentally sensitive areas | | | |
| E. Wastewater management resources | | | |
| (1) energy (power) | | | |
| (2) chemicals | | | |
| (3) land commitment for planned features including sludge disposal sites | | | |
| 5. Social and Economic Effects | | | |
| A. Population changes (5, 10, 15, and 20 year projections) | | | |

## TABLE 14.1 (cont)

## COSTS AND EFFECTS OF ALTERNATIVE PLANS

| Significant Effects | Alternative Plans | | |
|---|---|---|---|
| | P-1 | P-2 | P-3 |
| B. Changes in economic activity where appropriate | | | |
| (1) income per capita | | | |
| (2) agriculture | | | |
| (3) mining | | | |
| (4) manufacturing | | | |
| (5) services | | | |
| C. Dislocation of individuals, businesses, or public services | | | |
| D. Impact on other local, state and federal projects having major interaction with proposed water quality actions | | | |
| E. Public health | | | |
| F. Aesthetics | | | |
| (1) recreational accessibility and activities | | | |
| (2) unique archeological, historical, scientific and cultural areas | | | |
| (3) noise pollution | | | |
| 6. Implementation Feasibility | | | |
| A. Legal authority | | | |
| B. Financial capacity | | | |
| C. Practicability | | | |
| D. Coordinative capacity | | | |
| E. Public accountability | | | |
| 7. Public Acceptability | | | |

## TABLE 14.2

## LEAST COST PLAN

PLAN ELEMENTS (A summary list of planning, construction, zoning, sludge and effluent disposal, operations, monitoring actions, etc., indicating their geographic sites).

1.
2.
3.
.
.
.

TOTAL COST $__________

IMPACTS

DESCRIPTION

---

Economic

1.

2.

3.

Social

1.

2.

3.

Environmental

1.

2.

3.

---

IMPLEMENTATION

(Institutional and financial issues.)

## TABLE 14.3

### ALTERNATIVE LEAST COST PLAN MODIFICATIONS

| | Least Cost Alternative | Alternative A | Impacts | Cost Increase | Alternative B | Impacts | Cost Increase |
|---|---|---|---|---|---|---|---|
| Plan Elements | | | | | | | |
| 1. | | | | | | | |
| 2. | | | | | | | |
| 3. | | | | | | | |
| . | | | | | | | |
| . | | | | | | | |
| . | | | | | | | |

## GLOSSARY

The Act - Public Law 92-500. "This Act may be cited as the 'Federal Water Pollution Control Act Amendments of 1972.'" (Act, Section 1).

Base level technology - Minimum level of treatment required by the Act.

Basin - The term 'basin' means the streams, rivers, tributaries, and lakes and the total land and surface water area contained in one of the major or minor basins defined by EPA, or any other basin unit as agreed upon by the State(s) and the Regional Administrator.

Best Available Technology (BAT) - "Not later than July 1, 1983, effluent limitations for categories and classes of point sources, other than publicly owned treatment works...shall require application of the best available technology economically achievable for such category or class, which will result in reasonable further progress toward the national goal of eliminating the discharge of all pollutants as determined in accordance with regulations issued by the Administrator pursuant to section 304(b)(2) of this Act...." (Act, Section 301(b)(2)(A)).

Best Practicable Control Technology (BPCT) - "Not later than July 1, 1977, effluent limitations for point sources, other than publicly owned treatment works...shall require the application of the best practicable control technology currently available as defined by the Administrator pursuant to section 304(b) of this Act...." (Act, Section 301(b)(1)(A)). This is also referred to as Best Practicable Technology (BPT).

Best Practicable Waste Treatment Technology (BPWTT) - "Waste treatment management plans and practices shall provide for the application of the best practicable waste treatment technology before any discharge into receiving waters, including reclaiming and recycling of water and confined disposal of pollutants so they will not migrate to cause water or other environmental pollution...." (Act, Section 201(b)).

Capital intensive - Measure requiring initial capital outlays for its development and relatively little cost for operation and maintenance.

Combined sewer - "A sewer intended to serve as a sanitary sewer and a storm sewer, or as an industrial sewer and a storm sewer." (40 CFR 35.905-2).

Discharge of pollutants - "The term 'discharge of a pollutant' and the term 'discharge of pollutants' each means (A) any addition of any pollutant to navigable waters from any point source, (B) any addition of any pollutant to the waters of the contiguous zone or the ocean from any point source other than a vessel or other floating craft." (Act, Section 502(12)).

Effluent limitation - "The term 'effluent limitation' means any restriction established by a State or the Administrator on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean, including schedules of compliance." (Act, Section 502 (11)).

Effluent limited segments - "Any segment where it is known that water quality is meeting and will continue to meet applicable water quality standards or where there is adequate demonstration that water quality will meet applicable water quality standards after the application of the effluent limitations required by sections 301(b)(1)(B) and 301(b)(2)(A) of the Act." (40 CFR 130.2(o)(2)).

Facilities plan - The facility plan is the first step in a three step process required to complete treatment works with federal grants from the Environmental Protection Agency. It is to assure that treatment works built under this program are environmentally sound and cost-effective.

Infiltration - "The water entering a sewer system, including sewer service connections, from the ground, through such means as, but not limited to, defective pipes, pipe joints, connections, and manhole walls. Infiltration does not include, and is distinguished from, inflow." (40 CFR 35.905-9).

Inflow - "The water discharged into a sewer system, including service connections, from such sources as, but not limited to, roof leaders, cellar, yard and area drains, foundation drains, cooling water dischargers, drains from spring and swampy areas, manhole covers, cross connections from storm sewers and combined sewers, catch basins, storm waters, surface runoff, street wash waters, or drainage. Inflow does not include, and is distinguished from, infiltration." (40 CFR 35.905-11).

Inplace pollution source - Time buildup of pollutant load deposited in a receiving water bed and existing as a load upon that receiving water.

Interim Facility - A temporary treatment facility, either public or private, designed for a useful life of usually less than five years, and with a treatment capacity usually less than five million gallons per day.

**Land use** - The physical mode of utilization or conservation of a given land area at a given point in time.

**Land use controls** - Methods for regulating the uses to which a given land area may be put, including such things as zoning, subdivision regulation, and flood-plain regulation.

**Materials balance** - An illustration of the principle of conservation of matter; that is, an accounting may be performed of all transfers of mass from one point or state to other points or states, such that the total original mass is entirely accounted for.

**Maximum daily load** - "Each plan shall include for each water quality segment, or appropriate portion thereof, the total allowable maximum daily load of relevant pollutants during critical flow conditions for each specific water quality criterion being violated or expected to be violated." (40 CFR 131.11(f)(1)).

**Navigable waters** - "The term 'navigable waters' means the waters of the United States, including the territorial seas." (Act, Section 502(7)).

**1983 goals** - Pertains to goals outlined in Section 101(a) and elsewhere in the Act.

**1977 goals** - Pertains to the July 1, 1977 milestone set by the Act, particularly in terms of treatment technology and limitations.

**Nonpoint source** - Generalized discharge of waste which cannot be located as to a specific source into a water body, as outlined in Section 304(e) of the Act.

**Permits** - "The Administration may...issue a permit for the discharge of any pollutant, or combination of pollutants...upon condition that such discharge will meet either all applicable requirements under Sections 301, 302, 306, 307, 308, and 403 of this Act, or prior to the taking of necessary implementing actions relating to all such requirements, such conditions as the Administrator determines necessary to carry out the provisions of this Act." (Act, Section 402(a)(1)). "The Administrator shall authorize a state, which he determines has the capability of administering a permit program which will carry out the objective of this Act, to issue permits for discharges into the navigable waters within the jurisdiction of such state." (Act, Section 402(a)(5)). The permit program is a part of the National Pollutant Discharge Elimination System (NPDES).

Planning process - Strategy for directing resources, establishing priorities, scheduling actions, and reporting programs toward achievement of program objectives.

Point source - "The term 'point source' means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged." (Act, Section 502(14)).

Pollutant - "The term 'pollutant' means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water." (Act, Section 502(6)).

Pretreatment - "The Administrator shall...publish proposed regulations establishing pretreatment standards for introduction of pollutants into treatment works...which are publicly owned for those pollutants which are determined not to be susceptible to treatment by such treatment works or which would interfere with the operation of such treatment works." (Act, Section 307(b)(1)). "Not later than July 1, 1977...in the case of discharge into a publicly owned treatment works...shall require compliance with any applicable pretreatment requirements...under section 307 of this Act." (Act, Section 301(b)(1)(A)).

Residual waste - Those solid, liquid, or sludge substances from man's activities in the urban, agricultural, mining and industrial environment not discharged to water after collection and necessary treatment.

Secondary treatment - "There shall be required...for publicly owned treatment works in existence on July 1, 1977, or approved... prior to June 30, 1974...effluent limitations based upon secondary treatment as defined by the Administrator pursuant to section 304(d)(1) of this Act." (Act, Section 301(b)(1)(B)). "The Administrator...shall publish...information, in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants, on the degree of effluent reduction attainable through the application of secondary treatment." (Act, Section 304(d)(1)).

State water quality standards - The term "State Water Quality Standards" means those State adopted and Federally approved uses and criteria that are legally applicable to the interstate and intrastate waters. The water quality standards are incorporated by reference in Part 120 of Title 40 of Code of Federal Regulations.

Storm sewer - "A sewer intended to carry only storm waters, surface run-off, street wash waters, and drainage." (40 CFR 35.905-22).

Upstream pollutant source - Source of pollutant discharged into the receiving waters which is located upstream from the area of consideration.

Waste load allocation - A waste load allocation for a segment is the assignment of target loads to point, and to nonpoint sources to achieve water quality standards in the most effective manner.

Waste treatment facilities - "Any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of a liquid nature...in addition...any other method or system for preventing, abating, reducing, storing, treating, separating, or disposing of municipal waste, including waste in combined storm water and sanitary sewer systems." (Act, Section 212(2)). Also termed treatment works.

Water quality limited segments - "Any segment where it is known that water quality does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards even after the application of the effluent limitations required by sections 301(b)(1)(B) and 301(b)(2)(A) of the Act." (40 CFR 130.2(o)(1)).

# ANNOTATED BIBLIOGRAPHY FOR STATE WATER QUALITY MANAGEMENT PLANNING

This bibliography has been prepared to assist those engaged in State WQM Planning. The references have been arranged to correspond to the planning process elements and outputs. References cited have been selected for their applicability to State WQM Planning and for their availability.

Each reference is followed by a short abstract and, whenever possible, by detailed price and ordering information. Instructions for using the Government Printing Office and the National Technical Information Service are also included on the last page.

## PLANNING PROCESS ELEMENTS

### PROCESS DEVELOPMENT AND WORKPLAN CONTROL

Workplan Handbook for Section 208 Areawide Waste Treatment Management Planning. U.S. EPA. Wash. D.C. '75. Available upon request from EPA Regional Offices.

> Provides details on the preparation of areawide planning workplans. The handbook provides examples of workplan elements to assist locally designated planning agencies in preparing 208 workplans.

### PUBLIC PARTICIPATION PROGRAM/INTERAGENCY COORDINATION

A Citizen's Guide to Clean Water. U.S. EPA. Wash. D.C. June '73. Available upon request from U.S. EPA Office of Public Affairs (A-107) Wash, D.C. 20460.

> 95 page booklet provides the layman with a good introduction to the problem of water pollution and what can be done to solve it including citizen action. Explains major EPA water pollution abatement programs and emphasizes role of the citizen.

A Ladder of Public Participation, "Journal of the American Institute of Planners", Vol. 35, no.4. Sherry R. Arnstein. Wash. D.C. July, '69. Reprints of journals are available from Kraus Thomson Organization Ltd., Route 100, Millwood, N.Y. 10546, $3.75 per copy, State month and year of journal desired.

> A typology of citizen participation is offered using examples from three federal social programs: urban renewal, anti-poverty, and Model Cities. The typology, which is designed to be provocative, is arranged in a ladder pattern with each rung corresponding to the extent of citizens's power in determining the plan and/or program.

Agreement for Implementation of Section 304(j) of the Federal Water Pollution Control Act Amendments of 1972. Federal Register Vol. 38 No. 225, Nov 25, '73.

> Agreement between EPA and Departments of Interior, Agriculture and Army on setting up 208 advisory committees with representation of signatory agencies.

Analysis of New Techniques for Public Involvement in Water Planning. Water Resources Bulletin Vol. 11, No. 2 page 329. April '75. Back issues available at $4.00 per copy from Dana Rhoads, American Water Resources Association, St. Anthony Falls Hydraulic Lab, Mississippi River at 3rd Ave. S.E., Minneapolis, Minnesota 55414.

Several techniques that have potential for overcoming some of the limitations of standard public involvement techniques have recently been developed. This paper describes several of these new techniques and analyzes each of them in terms of their potential utility in water resources planning.

Areawide Waste Treatment Management Planning. U.S. EPA. Wash. DC. Nov '74. GPO (stock no. 625-620) or single copies available from U.S. EPA Office of Public Affairs (A-107) Wash. D.C. 20460.

A 13 page booklet explaining the EPA's areawide waste treatment management planning program under Section 208 of the Act. Explains to layman what areawide planning is, what it can do, and how it relates to other EPA programs. Explains roles of Federal, State, and local agencies in the planning process. Suitable for public information.

Citizen Participation Strategies, "Journal of the American Institute of Planners". Edmund M. Burke. Wash. D.C. Sept '68. Reprints of journals are available from Kraus Thomson Organization Ltd., Route 100, Millwood, N.Y. 10546, $3.75 per copy. State month and year of journal desired.

Suggests that many of the problems planners and others have had in involving the public in decision making can be resolved by recognizing and adopting a strategy of participation specifically designed to fit the role and resources of a particular organization. Five types of strategies are identified: Education-therapy, behavioral change, staff supplement, cooptation, and community power.

First Things First: A Strategy Against Water Pollution. U.S. EPA. Wash. D.C. Sept '74. GPO (stock no. 551-507) or single copies available from U.S. EPA Office of Public Affairs (A-107) Wash. D.C. 20460.

A 16 page booklet explaining the major elements of the strategy used by the U.S. Environmental Protection Agency and the States in their attack on water pollution, the problems faced and what is being done about them. Suitable for public information.

Joint Agreement for Interagency Coordination of Areawide Waste Treatment Management Planning Assistance to State and Local Governments between EPA and the Department of the Army. Federal Register Vol. 40 No. 11, Jan 16, '75.

Agreement between EPA and Department of the Army which established coordination between the Corps of Engineers Urban Studies Program and the 208 Program.

Public Participation in Water Resources Planning. University of Michigan, Ann Arbor. '71. NTIS PB 204-245.

Reviews public participation activities and procedures which have been utilized in connection with governmental planning studies, especially water resources planning studies. Discusses identification of public; functions and objectives; mechanisms for securing involvement; and timing. Also presents a model for a participatory planning process.

Selected Techniques for Soliciting Community Participation in Transportation Planning. Julie Hetrick Schermer. New York, NY, '74. Copies of this paper available upon request from Mr. William Reed, Director of Publications, Parson, Brinckerhoff, Quade & Douglas, Inc. 1 Penn Plaza, 250 W. 34th St., New York, NY 10001.

Five techniques for greater community participation recently employed in major transportation planning projects are reviewed and assessed in this paper. They are equally applicable to waste treatment management planning and include "citizen committees", "randomly selected participation groups", "open door policy", "direct funding to community groups", and "planning balance sheet".

The Role of Citizen Advisory Groups in Water Resources Planning, Publication No. 43. Madge Ertel, Water Resources Research Center, University of Massachusetts at Amherst, July, '74. Available At $3.00 per copy from Water Resources Research Center, University of Mass., A211 Graduate Research Center, Amherst, Mass. 01002.

Report is the result of case study observation of the citizen advisory groups operating in conjunction with three planning studies. Describes the ways in which these groups have dealt with problems and to generalize from their experience for the benefit of other citizen advisory groups and planning agencies. Concludes with a set of practical "guidelines" derived from this research, for the use of planning agencies seeking to maximize the effectiveness of citizen advisory groups.

Water Resources Decision Making on the Basis of the Public Interest. Report No. IWR Contract Report 75-1. U.S. Army Engineer Institute for Water Resources, Fort Belvoir, Va, Feb '75. NTIS, AD/A 010 402 $4.25.

The concept of water resources decison making in the public interest is both fundamental and elusive. This report discusses alternative perspectives that have been suggested for defining the public interest and provides an overview of the decision making in involved in a typical water resources planning study. It then examines various approaches to determining the public interest in preauthorization planning and decision making.

## ESTABLISHMENT OF PLAN OBJECTIVES

Guidelines for Areawide Waste Treatment Management. U.S. EPA. Wash. D.C. Aug '75. Available upon request from EPA Regional Offices.

> Intended to assist 208 planning agencies in carrying out their areawide waste treatment planning responsibilities within designated area. It applies also to other agencies—local, State and Federal—that may be involved in the planning process for those areas or in plan review procedures.

Policies and Procedures for State Continuing Planning Process. (40 CFR Part 130). Federal Register, Vol. 40 No. 137 July 16, '75.

> These regulations describe the necessary elements of a State's continuing planning process, and therefore provide policies and procedures for review, revision and approval of a State's continuing planning process. Also provided is a mechanism for satisfaction of the Statewide responsibilities of other sections of the Act. They apply to phase I plans (those submitted before July 1, '76.)

Preparation of State Water Quality Management Plans (Proposed Rules). (40 CFR Part 131). Federal Register, Vol. 40, No. 137, July 16, '75.

> These amended regulations describe the requirements for preparation of water quality management plans and the procedures governing plan adoption, submission, revision, and EPA approval. These regulations apply to phase II plans (those submitted after July 1, '76).

Preparation of Water Quality Management Plans. (40CFR Part 131) Federal Register, Vol. 39, No. 107, June 3, '74. (under revision)

> These regulations describe requirements for preparation of basin plans and the procedures governing basin plan adoption, submission, revision, and EPA approval. They apply to phase I plans (those submitted before July 1, '76).

DATA COLLECTION (economic, demographic, land use, environmental impact, waste loads, monitoring program, water quality data)

PROJECTIONS OF WASTE LOADS (projection of economic, demographic, land use factors to develop waste load projections, interim outputs, related to facilities planning.)

Design of Cost-Effective Water Quality Surveillance Systems, Report No. EPA 600/5-74-004. U.S. EPA. Wash. D.C. Jan. '74. GPO, $4.05.

Presents the development and successful demonstration of quantitative methods for the design of river basin water quality surveillance systems for pollution abatement. The methods provide a systematic approach to the consideration of expected stream conditions, system characteristics, equipment performance, and cost in the selection of a preferred system design from among a number of candidates. Methods are computerized and programs are detailed in the report.

Design with Nature. Ian McHarg. Garden City: Natural History Press, 1969. Published for the American Museum of Natural History. The Natural History Press, Garden City, NY, 501 Franklin Ave., Garden City, NY 11530.

Demonstrates by using concrete examples how man's new knowledge of ecology can be applied to actual environments, both natural ones such as seashores, lakes, rivers, and swamps and those that man has created such as large cities. Emphasis is placed on the concept of design with nature and showing how man can impose design but "use to the fullest, the potentialities and with them, necessarily, the restrictive conditions - that nature offers."

Guidelines for Preparation of Water Quality Management Plans. U.S. EPA. Wash. D.C. '74. Available upon request from EPA Regional Offices.

Describe the preparation of basin plans pursuant to the State continuing planning process (Section 303(e) of the Federal Water Pollution Control Act Amendments of 1972 and 40 CFR Part 130-131). They are intended for use as the basin planning methodology by State and local personnel in preparing water quality management plans.

1972 OBERS Projections; Economic Activity in the U.S.; Based on Series E Population, Vol. I-VII. (U.S. Water Resources Council). Wash. D.C. '74. GPO, stock no.: Vol. I, 5245-0013, $3.05; Vol. II, 5245-00014, $2.50; Vol. III, 5245-00015, $3.10; Vol. IV, 5245-00016, $1.90; Vol. V, 5245-00017, $2.75; Vol. VI, 5245-00018, $2.50; Vol. VII, 5245-00019, $2.75.

The projections in this report incorporate the Census Bureau's 1972 "Series E" national population projection. Vol. I: Concepts, Methodology and summary data. Vol. II: BEA Economic Areas, Vol.III: Water Resources Regions and Subareas, Vol. IV: States, Vol. V: Standard Metropolitan Statistical Areas, Vol. VI: Non-SMSA Portions of BEA Economic Areas, Vol. VII: Non-SMSA Portions of Water Resources Subareas.

Program Guidance Memorandum AM-2. U.S. EPA, Water Planning Division. Wash. D.C., March '75. Available upon request from EPA Regional Offices.

Sets forth policy and procedures concerning the use of interim outputs to guide facilities planning after award of a 208 grant.

Program Guidance Memorandum AM-8. U.S. EPA, Water Planning Division Wash. D.C. May '75. Available upon request from EPA Regional Office.

Transmits policy and decision rules to allow Regional Offices to evaluate designated agency grant applications for acceptable water quality analysis and modeling, waste load estimation, and data collection efforts in proposed workplans for designated 208 areas.

Promoting Environmental Quality Through Urban Planning and Controls. Report No. 600/5-73-015. U.S. EPA. Socioeconomic Environmental Studies Series, Feb '74. NTIS PB-227-090/8. $11.50.

Focuses on the changing awareness and current practices in promoting environmental quality through urban planning and controls in local and metropolitan planning agencies. Includes a review of planning practices in the 1960's related to environmental quality; and a detailed examination of numerous planning approaches and controls considered to be promising for future environmental quality enhancement.

Stream Quality Preservation Through Planned Urban Development. U.S. EPA. Report No. EPA R5-73-019. Socioeconomic Environmental Studies Series, Wash. D.C. May '73. GPO, $2.60. NTIS PB 222-177.

The effects of a land use plan to restrict urban development in areas critical to the water resouce system are identified through empirical studies for example: relationships are established between amount, density, type and location of urban development, on the one hand, and stream water quality and stream channel enlargement on the other.

The Quiet Revolution in Land Use Control. U.S. Council on Environmental Quality. Fred Bosselman and David Callies. Wash. D.C. GPO, stock no. 4111-0006, $2.75

A report on the innovative land use laws of several States. The report examines in detail several different Statewide regulatory systems, several systems where "critical areas" only are regulated and several systems focusing on key types of land development. The examinations are based primarily on a review of the key statutes regulations and decisions and on interviews with administering officials and other groups. Key issues that run through all systems are synthesized.

Urban Land Use Planning. F. Stuart Chapin, Jr. Urbana, Illinois: University of Illinois Press, '65.

Focuses primarily on theory and methods with special attention given to the techniques required in making analysis of land use, in measuring trends, and in estimating present and future requirements for the uses of land. Aspects concerned with the legal basis of planning, its legislative controls and its administrative organization are specifically excluded from detailed treatment.

WATER QUALITY ANALYSIS (Model selection, calibration, verification, prediction of water quality impact of waste loads, waste load allocations--including interim outputs related to facilities planning)

Guidelines for Preparation of Water Quality Management Plans. U.S. EPA. Wash. D.C. '74. Available upon request from EPA Regional Offices.

Abstract: See previous reference

Program Guidance Memorandum AM-2. U.S. EPA, Water Planning Division Wash. D.C. March '75. Available upon request from EPA Regional Offices.

Abstract: See previous reference

Simplified Mathematical Modeling of Water Quality, (with addendum). U.S. EPA. Wash. D.C. March '71. Available from: Planning Assistance and Policy Branch, (WH-554) U.S. EPA, Wash. D.C. 20460.

A general simplified methodology for the application of mathematical models to the analysis of water quality. The parameters modeled include certain dissolved oxygen in streams and estuaries. The modeling efforts have been incorporated into various tables, nomographs and figures, and along with some technical data, may be used to estimate treatment levels to meet specific water quality standards.

Information regarding the applicability and availability of other specific water quality models is available from: Mr. William Somers, Technical Assistance Section, Planning Assistance Branch (WH-554) U.S. EPA, Washington, D.C. 20460.

The following 208 planning process elements are the basis for developing the 208 outputs which follow on the next pages. References on these elements are broken down according to the 208 outputs which follow

DEVELOPMENT OF ABATEMENT ALTERNATIVES

DEVELOPMENT OF IMPLEMENTATION ALTERNATIVES
(legal, financial, institutional analysis, proposed management agency(s) and institutional arrangement to carry out abatement programs, including needed regulatory programs)

IMPACT EVALUATION AND PLAN SELECTION
(environmental assessment, plan evaluation, plan selection through public involvement)

PLAN REVIEW/APPROVAL
(local review and recommendation, State review/approval, EPA review/approval)

## 208 OUTPUTS

Municipal and Industrial Treatment Works Program (first six)

INTERIM OUTPUTS FOR FACILITY PLANNING

Interim Output Evaluation Handbook for Section 208 Areawide Waste Treatment Management Planning. U.S. EPA. Wash. D.C. '75. Available upon request from EPA Regional Offices.

> Deals with interim outputs expected within the first 9 months of the two-year 208 areawide waste treatment management planning program namely: service area delineation, population and land use projections, flow and waste load projections, and waste load allocation revisions.

Program Guidance Memorandum AM-2. U.S. EPA, Water Planning Division. Wash. D.C. March '75. Available upon request from U.S. EPA Regional Offices.

> Abstract: See previous reference.

FURTHER FACILITY PLANNING

Guidance for Facilities Planning. U.S. EPA. Wash. D.C. May, '75. Available upon request from EPA Regional Offices.

> Suggests procedures for engineers, planners, municipalities and local, State and Federal agencies to follow in seeking grants for the construction of publicly owned treatment works. The procedures are intended to assure that treatment works to be constructed will be cost-effective, environmentally sound and publicly accepted.

Program Guidance Memorandum AM-1. U.S. EPA, Water Planning Division. Wash. D.C. March '75. Available upon request from EPA Regional Offices.

> Transmits policy statement issued March 11, 1975 by the Assistant for Water and Hazardous Materials on the subject of the relationship between 201 facilities planning and 208 areawide planning. (attached)

SEWER AND HOOK-UP ORDINANCE

Problems and Approaches to Areawide Water Quality Management. Vol. I-IV. U.S. EPA. School of Public and Environmental Affairs, Indiana University, Wash. D.C. '73. NTIS PB-239-808. $25.00

> This report deals with the issues of the adequate authority of designated waste treatment management agencies to perform as required by Section 208(c)(2) and related sections of the Act. "Adequate authority" includes both the legal authority and the management capability of the agencies. The report is based on a legal analysis of the laws of the fifty states and of federal legislation, and on a survey of existing waste treatment management agencies. The study consists of a main report, an executive summary, and two separately bound appendices: Appendix A- Suggested Representative or Model legislation, Appendix B - States Reports.

WPCF Manual of Practice No. 3 Regulation of Sewer Use. Water Pollution Control Federation. Wash. D.C. '68. Available from Water Pollution Control Federation, 3900 Wisconsin Avenue, Wash. D.C. 20016, price $2.00

> The manual presents the case for legally constituted guidelines to regulate the use of public sewer systems. It does so through presentation of a model sewer use ordinance and a detailed discussion of its component parts.

PRETREATMENT ORDINANCES

Federal Guidelines, Pretreatment of Pollutants Introduced into Publicly Owned Treatment Works. U.S. EPA. Wash. D.C. Oct '73. Available upon request from EPA Regional Offices.

> Guidelines established to assist municipalities, States, and Federal agencies in developing requirements for the pretreatment of wastewaters which are discharged to publicly owned treatment works. Also explain relationship between pretreatment and effluent limitations for a publicly owned treatment works.

Improved Procedures for Municipal Regulation of Industrial Discharges to Public Sewers (forth coming). No report no. assigned. Draft available from U.S. EPA, Water Planning Division (WH-554), Wash. D.C. 20460.

Reviews the current status of local government control of industrial wastes discharged into publicly owned treatment works and finds them ineffective as a means of controlling large scale industrial activities. The report suggests an effective and economical regulatory scheme for complying with the federal pretreatment and effluent standards and the requirements imposed on federally-financed treatment works. The approach involves a contractual agreement between an industry and a public entity for treatment of the industry's wastewater.

Problems and Approaches to Areawide Water Quality Management, Vol. I-IV. School of Public and Environmental Affairs, Indiana University, Wash. D.C., '73. NTIS PB-239-808. $25.00

Abstract: See previous abstract

## DEFINITION OF INDUSTRIAL TREATMENT LEVELS AND TIE INTO MUNICIPAL SYSTEMS

Design Criteria for Mechanical, Electric, Fluid Systems and Component Reliability. U.S. EPA. Wash. D.C. NTIS PB-227-558/4. -

Amplifies and supplements the Federal Guidelines for Design, Operation, and Maintenance of Wastewater Treatment Facilities with regard to establishing minimum standards of reliability for mechanical, electric and fluid systems and components. Stresses component backup to attain system reliability.

Effluent Guidelines and Development Documents. U.S. EPA. Wash. D.C.

The Effluent Guidelines Division of the Office of Water and Hazardous Materials, EPA, has published effluent limitation guidelines for existing industrial sources and standards of performance and pretreatment standards for new industrial sources. Effluent limitation guidelines and standards have been published for each of a number of different industrial categories. In addition, for each industrial category, development documents have been published which contain supportive data and rationales for the development of the applicable effluent limitation guideline and performance standard. While all of the effluent limitations guidelines and development documents are too numerous to be referenced here, information pertaining to specific industrial categories can be obtained from, Ms. Frances Desselle, Effluent Guidelines Division (WH-552) U.S. EPA, Washington, D.C. 20460.

Federal Guidelines, Operation and Maintenance of Wastewater Treatment Facilities. U.S. EPA. Wash. D.C. Aug '74. Available upon request from EPA Regional Offices.

These guidelines are intended to assist in assuring that all aspects related to wastewater treatment plant operation and maintenance are appropriately considered by those responsible for complying with grant requirements, specific effluent permit criteria, and related water quality standards. They provide information on the key elements that should be included in any plan of operation for a wastewater treatment facility. Source documents offering more detailed information are referenced throughout.

Federal Guidelines, Pretreatment of Pollutants Introduced Into Publicly Owned Treatment Works. U.S. EPA. Wash. D.C. Oct '73. Available upon request from EPA Regional Offices.

Abstract: See previous reference.

Guidance for Sewer System Evaluation. U.S. EPA. Wash. D.C. '74. Available upon request from EPA Regional Offices. -

Intended to provide engineers, municipalities, regulatory agencies with guidance on sewer system evaluation to determine presence of excessive infiltration/inflow. Includes discussion of physical surveys rainfall simulation preparatory cleaning internal inspection and survey reports.

Waste Load Allocations in River Basin Plans.

River basin plans required under Section 303 of the Act contain waste load allocations for segments of streams designated water quality limited. These allocations would, of course, be useful in defining industrial treatment levels.

ORDINANCES ON LOCATION OF PRIVATE AND INDUSTRIAL DISCHARGES

Problems and Approaches to Areawide Water Quality Management, Vol. I-IV. U.S. EPA. School of Public and Environmental Affairs, Indiana University, Wash. D.C. '73. NTIS PB-239-808. $25.00

Abstract: See previous reference

RESIDUAL WASTE MANAGEMENT

Development of Residuals Management Strategies (forthcoming). U.S. EPA. Report No. not assigned. Wash. D.C. Draft copy available from U.S. EPA Water Planning Division (WH-554), Wash. D.C. 20460.

Study of the development of strategies for managing residuals. Contains step by step guidelines for identifying alternate residuals management strategies and then evaluating and selecting a strategy. Presents a residuals generation and discharge model which identifies different methods for complying with recent federal legislation that requires a specified level of environmental quality and identifies many points in the residuals generation and discharge process at which physical methods can be introduced or changes made, to reduce or alleviate the effect of discharging residuals into the environment.

Evaluation of Land Application Systems, Technical Bulletin, EPA Report No. EPA 520/9-75-001. U.S. EPA. Wash. D.C., March '75. GPO, NTIS (awaiting number assignment).

Procedures are set forth to assist EPA personnel in evaluating treatment systems that employ land application of municipal wastewater. In addition information is provided which may be of value to State, local and other Federal agencies. Consists of an Evaluation Checklist, parallel background information and is divided into three major parts dealing with: (1) facilities plans, (2) design plans and specifications, and (3) operation and maintenance manuals.

Information Package on Residual Waste Management. U.S. EPA. Wash. D.C. Oct '75. Available upon request from U.S. EPA, Planning Assistance and Policy Branch (WH-554) Wash. D.C. 20460.

Contains a bibliography of helpful publications. Provides description and status of ongoing research and/or demonstration projects dealing with residual waste management.

Land Application of Sewage Effluents and Sludges: Selected Abstracts, Report No. EPA 660/2-74-042. U.S. EPA. National Environmental Research Center, Corvallis, Oregon. 1974. GPO, $2.80, NTIS PB 235-386 $8.50

Combines selected abstracts from previous publications and updates the sources abstracted into the year 1973. The 568 abstracts selected for inclusion are arranged in chronological groupings and are identified as to emphasis on effluent or sludge.

Municipal Sewage Treatment: A Comparison of Alternatives. Council on Environmental Quality and U.S. EPA. Wash. D.C., Feb '74. GPO.

Provides a single document which can be utilized on a comparative basis, to develop preliminary selections of appropriate wastewater treatment schemes for a municipality. The format of the text allows the reader to compare various treatment strategies on an energy, environmental or economic basis and to develop cost figures which may better reflect a particular local situation.

Process Design Manual for Sludge Treatment and Disposal, Report No. EPA 625/41-74-006. U.S. EPA. Wash. D.C., Oct'74. Available upon request from U.S. EPA Office of Technology Transfer, CM#2 Rm 1014, RD 677. Wash. D.C. 20460.

Presents a contemporary review of sludge processing technology and the specific procedures to be considered, modified, and applied to meet unique conditions. Emphasizes operational considerations and interrrelationships of the various sludge treatment processes to be considered before selecting the optimum design. Also presents case histories of existing wastewater treatment plants to illustrate the varous unit processes and results.

Wastewater Treatment and Reuse By Land Applicability, Vol. I, Report No. EPA 660/2-73-006a. Vol. II 660/2-73-006b. U.S. EPA. Wash. D.C. Aug '73 GPO Vol. 1 - $1.10, Vol. II - $2.40

Report of a nationwide study of current knowledge and techniques of land application of municipal treatment plant effluents and industrial wastewaters. Information and data were gathered on the many factors involved in system design and operation for the three major land application approaches: irrigation, overland flow, and infiltration-percolation. In addition, evaluations were made of environmental effects, public health considerations, and costs—areas in which limited data are available.

## URBAN STORMWATER MANAGEMENT PROGRAM

Comparative Analysis of Urban Stormwater Models. U.S. EPA. Nov '74. Available upon request from U.S. EPA, Planning Assistance and Policy Branch (WH-554), Wash. D.C. 20460.

Eighteen mathematical models for the nonsteady simulation of runoff in urban storm and combined sewerage systems were reviewed in a study sponsored by EPA. Most of the models evaluated include the nonsteady simulation of the rainfall-runoff process and flow routing in sewers. A few also include the simulation of wastewater quality, options for dimensioning sewerage system components, and features for realtime control of overflows during rainstorms.

Contributors of Urban Roadway Usage to Water Pollution, Report No. EPA 600/2-75-004. U.S. EPA. Wash. D.C. March '75. NTIS no. not assigned yet.

Study of contributions of motor vehicle usage to urban roadway loading factors. Specific roadway study sites within the non-industrial Washington, D.C. area were selected so as to provide minimal interference from non-traffic-related land use activities and thus isolate, as much as possible, the traffic-related depositions.

Practice in Detention of Stormwater Runoff. Herbert G. Poertner, American Public Works Association, '74. NTIS PB-234-554.

> On-site detention of runoff was investigated as an alternative to other methods of urban stormwater runoff management. It was found that this method, which involves collecting excess runoff before it enters the main drainage system, can often be applied an an effective and economical means of reducing peak runoff slow rates to lessen or eliminate problems of flooding, pollution, soil erosion, and siltation.

Urban Stormwater Management Research and Planning Projects for FY 1975

and FY 1976, Information Package. U.S. EPA. Wash. D.C. March '75. Available upon request from U.S. EPA, Planning Assistance Branch (WH-554), Wash. D.C. 20460.

> Information contained in this report is concerned with urban stormwater management. Well over one hundred projects were reviewed and those selected to be included within this report were chosen because of their contribution to the planning process for urban stormwater management. Five areas within the planning process are identified and projects are categorized appropriately. Also includes a list of bibliographies where information on projects done prior to FY 75 is available.

Urban Stormwater Management and Technology: An Assessment, Report No. EPA 670/2-74-040. U.S. EPA. National Environmental Research Center, Cincinnati, '74. GPO, NTIS, PB 240-687/AS $11.50.

> The results of a comprehensive investigation and assessment of promising, completed, and ongoing urban stormwater projects, representatives of the state-of-the-art in abatement theory and technology. Presented in a textbook format, provides a compendium of project information on management and technology alternatives within a project framework of problem identification, evaluation procedures and program assessment and selection.

Water Quality Management Planning for Urban Runoff. Report No. EPA-440/9-75-004. U.S. EPA. Wash. D.C. Dec '74. NTIS PB 241-689/AS $7.50

> Provides technical assistance to state and local water quality management planners to enable them to quantify within reasonable limits the urban non-point water pollution problem in a local planning area without extensive data generation, and to make a preliminary evalution of cost-effective abatement and control practices. Prescribes procedures for several levels of input, each requiring more self-generated data, with increasingly sophisticated results.

Water Resources Protection Measures in Land Development: A Handbook U.S. Dept. of Interior, Office of Water Resources. Wash. D.C. '74. NTIS PB 236-049.

Description of measures that can become an integrated part of urban development to lessen problems that would otherwise adversely affect water resources. Measures are presented in groups and related directly to the problems of runoff, erosion, sedimentation, flooding, runoff pollution and increased sewage effluent discharge. Each group is preceded by a flow chart that relates individual measures to each other and can aid in the selection of alternative techniques that follow a logical sequence.

## NONPOINT SOURCES MANAGEMENT GENERAL

Methods for Identifying and Evaluating the Nature and Extent of Nonpoint Sources of Pollutants, Report No. EPA 430/9-73-014. U.S. EPA Wash. D.C. '73. GPO, $2.45

This report issued under Section 304(e) provides general information on the identification and assessment of nonpoint sources. Particular attention is paid to agriculture, silviculture, mining, and construction.

Report on State Sediment Control Institutes Program, Report No. EPA 440/9-75-001. U.S. EPA. Wash. D.C. April '75. GPO Stock No. 582-421/246.

This report resumés the results of 40 State sediment control institutes sponsored by EPA, through a grant to the National Association of Conservation Districts. The status of laws in the states is covered and a model State law for sediment control is included.

## AGRICULTURAL SOURCE MANAGEMENT

Evaluation of Salinity Created by Irrigation Return Flows, Report No. EPA-430/9-74-006. U.S. EPA. Wash. D.C. '74. GPO, $1.65.

Report provides general descriptions of the problems, major problem areas, and remedial and control measures.

Methods and Practices for Controlling Water Pollution from Agricultural Nonpoint Sources, Report No. EPA 430/9-73-015. U.S. EPA. Wash. D.C. '73. GPO, $1.10.

Issued under Section 304(e), report provides general descriptions of various measures that may be used to control agricultural runoff. It is strongly directed to erosion and sediment control, but nutrients, pesticides, and animal wastes are covered.

Research Status on Effects of Land Application of Animal Wastes, Report No. EPA-660/2-75-010. U.S. EPA. Wash. D.C. NTIS awaiting number assignment.

> Report primarily resumés research results. However, in one chapter, it outlines a procedure for estimation of the effects of animal wastes on crop utilization nutrients.

Study of Current and Proposed Practices in Animal Waste Management, Report No. EPA 430/9-74-003. U.S. EPA. Wash. D.C. Jan. '74. GPO, $4.70.

> Report briefly discusses various methods of disposal and/or utilization of animal wastes. The report contains 362 pages of annotated bibliography.

Numerous Soil Conservation Service, Agricultural Research Service, and other EPA ORD Reports.

SILVICULTURAL SOURCE MANAGEMENT

Logging Roads and Protection of Water Quality, Report No. EPA 910/9-75-007. U.S. EPA. Seattle, Washington, March '75. NTIS no. not assigned yet.

> Report provides discussions and data for design, construction, use and maintenance of logging roads to prevent pollution. An overview of logging roads problems is provided.

Processes, Procedures and Methods to Control Pollution from Silvicultural Activities. Report No. EPA 430/9-73-010. U.S. EPA. Wash. D.C. '73. GPO, $1.25.

> This report issued under Section 304(e), provides general information on the nature of silviculture pollution control problems and on control methods. General predictive techniques and criteria for management programs are included.

MINING SOURCE MANAGEMENT

Processes, Procedures and Methods to Control Pollution from Mining Activities, Report No. EPA 430/9-73-011. U.S. EPA. Wash. D.C. '73. GPO, $3.40.

> Report provides general information on controls for surface and underground mines, and treatment methods. Some cost information is included.

Various publications of EPA (ORD), Bureau of Mines, SCS, Appalachian Regional Commission, and others.

## CONSTRUCTION SOURCE MANAGEMENT

Comparative Costs of Erosion and Sediment Control, Construction Activities, Report No. EPA 430/973-016. U.S. EPA. Wash. D.C. '73. GPO $2.20

> Cost information on erosion and sediment control measures has been assembled in this report, evaluated, and documented for more then 25 methods in current and widespread use in the United States.

Control of Erosion and Sediment Deposition from Construction of Highways and Land Development. U.S. EPA. Wash. D.C. Sept '71. GPO, $.60

> Discusses the causes and effects of excess sediment runoff, measures for control, costs, and administration.

Methods of Quickly Vegetating Soils of Low Productivity, Construction Activities, Report No. EPA 440/9-75-008. U.S. EPA. Wash. D.C., July '75. GPO Stock No. 210-810/11 1-3.

> Document prepared for use by planners, engineers, and resource managers who need to provide for the rapid establishment of a protective vegetative cover on bare soils on construction sites.

Processes, Procedures, and Methods to Control Pollution Resulting from All Construction Activity, Report No. EPA 430/9-73-007. U.S. EPA. Wash. D.C. '73. GPO, $2.30.

> Issued according to requirements of Section 304(e) of P.L. 92-500. Report provides information of a general nature regarding measures for controlling or preventing erosion and sediment runoff, stormwater, and pollutants other than sediments.

## HYDROGRAPHIC MODIFICATION MANAGEMENT

The Control of Pollution from Hydrographic Modifications, Report No. EPA 430/9-73-017. U.S. EPA. Wash. D.C. '73. GPO, $1.95.

> This report issued under Section 304(e) provides information and guidance for use in identification and evaluation of non-point sources of pollutants, and processes, procedures and control methods when pollution results from changes in the movement flow or circulation of any navigable waters or ground waters.

## GROUNDWATER POLLUTION MANAGEMENT

Ground Water Pollution from Subsurface Excavations, Report No. EPA 430/9-73-012. U.S. EPA. Wash. D.C. '73. GPO, $2.25.

Report issued under Section 304(e), provides information on identification and evaluation, and on control methods. Injection wells, lagoons, septic systems, land fills, pipe leakage, etc. are generally covered. Administrators Decisions Statement No. 5 is included.

Identification and Control of Pollution from Salt Water Intrusion. U.S. EPA. Wash. D.C. '73. NTIS PB 227-229/2.

Report issued under Section 304(e), provides general information on identification and assessment; and on control methods. Coastal and inland waters are covered.

Subsurface Pollution Problems in the United States, Report No. TS-00-72-02. U.S. EPA. Wash. D.C. May '72. GPO Stock No. 514-148/60.

Report provides very general information on types of subsurface problems experienced in the United States.

Subsurface Water Pollution, A Selected Annotated Bibliography. Part I - "Subsurface Waste Injection"; Part II - "Saline Water Intrusion"; Part III - "Percolation from Subsurface Sources". U.S. EPA. Wash. D.C. March '72. NTIS, Part I: PB-211-340; Part II: PB-211-341; Part III: PB-211-342.

A selective bibliography produced from the computerized data base of the OWRR Water Resources Scientific Information Center. Represents published research in water resources as abstracted and indexed in the semi-monthly journal, Selected Water Resource Abstracts. Represents a search of a 33,980 - item data base, covering SWRA from October 1968 through December 1971.

## MANAGEMENT FISCAL AND REGULATORY

1971-Suggested State Legislation (1971); 1972 Suggested State Legislation (1972); 1973 Suggested State Legislation (1973); 1974 Suggested State Legislation (1974); 1975 Suggested State Legislation (1975). Council of State Governments. Available from Council of State Governments, 1150 17th Street, N.W. Wash. D.C. 20036. $5.00 for each volume covering one year.

Includes suggested legislation that would be relevant for implementing 208 plans.

Institional Design for Water Quality Management; A Case Study of the Wisconsin River Basin, Vol. I-IX. Irving K. Fox. Resources Center, University of Wisconsin, Madison Wisconsin, 1971. NTIS PB-199-268.

A case study of the institutional arrangements for implementing areawide water quality management plans.

Problems and Approaches to Areawide Water Quality Management, Vol. I-IV. U.S. EPA. School of Public and Environmental Affairs, Indiana University, Wash. D.C., '73. NTIS PB-239-808. $25.00

Abstract: See previous reference

ENVIRONMENTAL ASSESSMENT

A Procedure for Evaluating Environmental Impact, Circular No. 645. Luna B. Leopold, et. al. U.S. Geological Survey. Wash. D.C. '71. Available upon request from U.S. Geological Survey, National Center, Reston, Virginia 22092.

Suggests an approach to evaluate the probable impact of a proposed action on the environment by providing a system for the analysis and numerical weighting of probable impacts. System uses the "generalized matrix" approach.

A Review of Environmental Impact Assessment Methodologies, Report No. EPA 600/5-74-002. U.S. EPA. Wash. D.C. April '74. GPO $.70, NTIS PB-236-609/AS.

Seventeen methodologies applicable to preparation of environmental impact statements are reviewed to identify their strengths, weaknesses, and potential range of use. Specific criteria are suggested for evaluating the adequacy of an impact assessment methodology.

An Approach to Evaluated Environmental Social and Economic Factors in Water Resources Planning. Water Resources Bulletin Vol. 8 No. 4 page 724. Aug. '72. Back issues available at $4.00 per copy from Dana Rhoads, American Water Resources Association, St. Anthony Falls, Hydraulic Lab, Mississippi River at 3rd Ave. S.E., Minneapolis, Minn. 55414.

Briefly discusses present methods of project evaluation and then describes an approach adapted from highway planning literature for evaluating both monetary and non monetary variables and presenting them to decision makers at all levels. Social and environmental consequences are analyzed using a graphical description method. Includes a case example.

Bibliography for Environmental Assessment and Impact Evaluation of Areawide Water Quality Management. U.S. EPA. Wash. D.C. Nov '75. Available upon request from U.S. EPA, Planning Assistance and Policy Branch (WH-554), Wash. D.C. 20460.

A bibliography of references dealing with environmental assessment and impact evaluation. Emphasis is placed on those relating to environmental assessment and impact evaluation of areawide water quality management.

Manual for Preparation of Environmental Impact Statements for Wastewater Treatment Works, Facilities Plans, and 208 Areawide Waste Treatment Management Plans. U.S. EPA. Wash. D.C. '74. Available upon request from U.S. EPA, Office of Federal Activities (A-104), Wash. D.C. 20460.

Provides the framework for preparing environmental impact statements (EIS's) when required on wastewater treatment works, facilities plans, or 208 areawide waste management plans. Provides certain minimum standards of completeness and consistency in those EIS's prepared by EPA in the above categories.

Performance Controls for Sensitive Lands: A Practical Guide for Local Administrators, Report No. EPA-600/5-75-005. U.S. EPA. Wash. D.C. March '75. NTIS, awaiting number assignment.

Intended as handbook for use by local planning officials in planning for and regulating use of streams and creeks, wetlands, woodlands, hillsides, and groundwater and aquifer recharge areas. Discusses ecology and value of sensitive areas, and recommends regulatory programs. Includes appendices on obtaining technical assistance.

The Impact Assessment Scenario. A Planning Tool for Meeting the Nation's Energy Needs. Report No. M-72-56. Martin V. Jones. The Mitre Corporation, McLean Virginia. April '72. NTIS PB-211-471.

Seeks to illustrate how the scenario technique, developed by systems analysts in sixties, can be adapted to help accomplish comprehensive, systematic planning in the energy field. Concepts developed apply, however, to water quality management.

Secondary Impacts of Transporation and Wastewater Investments: Review and Bibliography. Report No. EPA 600/5-75-002. U.S. EPA. Wash. D.C. Jan '75. NTIS awaiting no. assignment.

A review of over 50 major studies and 300 relevant reports related to secondary environmental impacts on various forms of public investments, e.g. land based transportation and wastewater collection systems.

Secondary Impacts of Transportation and Wastewater Investments: Research Results, Report No. EPA 600/5-75-013. U.S. EPA. Wash. D.C. July '75. NTIS, awaiting number assignment.

The second report of a 2 part research study. This report presents the results of original research on the extent to which secondary development can be attributed to highways and wastewater treatment and collection, and what conditions under which causal relations appear to exist.

## INSTRUCTIONS FOR ORDERING PUBLICATIONS

### National Technical Information Service (NTIS)

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

The National Technical Information Service has available for sale, both paper and microfiche copies of many EPA technical reports. Some reports are, however, available only in microfiche. Information on availability and prices is given only by mail and can be obtained by writing to the NTIS and giving them the following information:

1. Title of the report
2. NTIS accession number (usually in the form: PB-000-000).
3. EPA Report No. (If known, usually in the form: EPA 000/0-00-000).
4. Number of copies required.
5. Paper copies or microfiche.

NTIS will respond by mail with a price quote and availability statement. Publications can then be ordered by mail with payment enclosed.

### U.S. Government Printing Office (GPO)

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

The Government Printing Office has available for sale, paper copies of many EPA and other agency publications. Information on the availability and price of publications can be obtained by calling the Publications Information/Order Desk at GPO in Washington, D.C. The desk can be reached at area code 202, 783-3238. The following information will be needed.

1. Title of the report.
2. EPA Report No. (usually in the form: EPA 000/o-00-000).
3. GPO Stock No. (if known).

The Information/Order Desk can then check the availability and quote the price. If the publication is available a check for the amount, payable to the Superintendent of Documents, can be mailed with the order to GPO. Publications will be mailed upon receipt of the payment. If ordering in the Washington, D.C. area publications can be picked up in person at GPO. When calling for information and price ask the clerk to assign a pick-up number. The publications can then be picked up in person at GPO.

# GUIDELINES FOR STATE AND AREAWIDE WATER QUALITY MANAGEMENT PROGRAM DEVELOPMENT
## SUPPLEMENT NO. 1
## BEST MANAGEMENT PRACTICES

### 1.1 Introduction

This Supplement No. 1 to the Guidelines for State and Areawide Water Quality Management Program Development provides additional guidance to that already contained in regulations and guidelines. Policies and Procedures for the State Continuing Planning Process (40 CFR 130) and Preparation of Water Quality Management Basin Plans (40 CFR 131) delineate requirements for the utilization of Best Management Practices (BMP) in water quality management programs. Procedures for implementing the BMP concept are detailed in the Guidelines for State and Areawide Water Quality Management Program Development. These regulations and guidelines call for States to select BMP applicable to the pollution problems and particular conditions in each State. Where designated 208 areas or agencies exist within a State, the State and the 208 agencies must work together in establishing appropriate BMP for the designated area. The purpose of this Supplement No. 1 is to illustrate for various nonpoint sources alternative management practices that States might consider in choosing the BMP.

### 1.2 Definition of Best Management Practices (BMP)

The term Best Management Practices (BMP) means a practice, or combination of practices, that is determined by a State (or designated areawide planning agency) after problem assessment, examination of alternative practices, and appropriate public participation to be the most effective, practicable (including technological, economic, and institutional considerations) means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals.

### 1.3 Concept of BMP

The control of pollutants in the runoff, seepage and percolation from nonpoint sources can be accomplished through management of the sources. BMP is intended to be an acceptable basis for State management of nonpoint sources and to be of assistance for pollution abatement under NPDES. BMP are the management techniques necessary to protect water quality. The management techniques (BMP) are to be determined by State and local government.

Point sources are defined in P. L. 92-500. Nonpoint sources are not defined. By inference, nonpoint sources are those sources that result in diffuse runoff (seepage, infiltration and percolation) of pollutants to the nation's waters.

Point sources will be managed under the National Pollutant Discharge Elimination System (NPDES). Permit issuance is based on Best Practical Technology (BPT) and/or Best Available Technology (BAT). Permit issuance and regulatory followup will be carried out by the States or by EPA where authority for NPDES has not been delegated to the States.

Nonpoint sources will be managed under the authorities of Section 208. This Section of the FWPCA specifies that the States have the primary responsibility for managing and controlling nonpoint sources of pollution under Federal overview and with Federal assistance and cooperation. The mandatory State control program required by the Act may be based upon utilization of BMP provided that the State Water Quality Management program contains adequate measures for the identification of nonpoint source problems, selection of such practices to correct existing and prevent future nonpoint source problems, and assure implementation of approved, planned, or proposed practices; including required regulatory and enforcement systems.

This guidance is primarily intended to apply to the BMP as they may be used in the control of nonpoint sources. However, the BMP may be equally as valuable in reducing the pollutants in point discharge sources. In essence, the BMP should be considered as a useful tool for reducing pollutants regardless of whether the source is classified as a point or nonpoint source for planning, management, and regulatory purposes.

Because of the variability in sources, topography, climate, soils, etc., no one BMP will be applicable to all activities or situations. The BMP must be tailored to the needs of the particular source and to the physical conditions that will govern its application. It is expected that State and local expertise, fully familiar with both the sources and the physical conditions, will be utilized in the final selection of BMP.

### 1.4 General Criteria for Choosing BMP for Nonpoint Sources

The definition of BMP states several criteria or tests which should be applied by the State in choosing Best Management Practices (BMP):

- a BMP should manage "pollution generated by nonpoint sources"
- a BMP should achieve water quality "compatible with water quality goals"
- a BMP should be "most effective in preventing or reducing the amount of pollution generated"
- a BMP should be "practicable"

### A. A BMP should manage "pollution generated by nonpoint sources"

Water pollution sources can be functionally categorized in accordance with man's activities. This type of categorization has been used in Section 208 and 304(e), P. L. 92-500 in connection with nonpoint sources. It is considered to be applicable to the selection of BMP to prevent or reduce pollution from these sources. As a minimum, the State should consider the following activity categories in its establishment of BMP for nonpoint sources:

1. Agricultural Activities
2. Silvicultural Activities
3. Mining Activities
4. Construction Activities
5. Urban Runoff
6. Hydrologic Modifications
7. Sources Affecting Ground Water
8. Residual Wastes Disposal

The use of this classification of sources should not be interpreted as placing sources into nonpoint or point categories. As emphasized earlier, BMP will be useful in preventing or reducing pollutants in both nonpoint and point sources of water pollution.

The interrelation of the activities outlined above should be considered in the selection of BMP. It may be advantageous to further categorize the nonpoint sources based on similar control aspects. Utilization of sub-categorization could reduce the amount of duplication in the selection of management practices. Examples of such sub-categorizations are: (1) by similar physical conditions, e.g., soils, slope, precipitation patterns; (2) by similar activities, e.g., soil disturbance -- construction, strip mining, land development; (3) by site-specific characteristics, e.g., all activities in a single area of like conditions; and (4) by pollutant to be controlled, e.g., sediments, acidity/alkalinity, oxygen demanding materials.

### B. A BMP should achieve water quality "compatible with water quality goals"

Through analysis of existing water quality data and of newly acquired data where necessary, target levels of abatement should be chosen for each planning area in the State. The BMP should be selected in terms of meeting these targets. The pollutants that must be controlled should be determined. While BMP will normally prevent or reduce several pollutants, the final selection of BMP should be related to those pollutants that must be controlled to achieve water quality goals.

## C. A BMP should be "most effective in preventing or reducing the amount of pollution generated"

The State should select criteria against which the effectiveness of the BMP can be related. These criteria (lbs/tons per day/week/month/year, lbs/tons per acre/square mile/basin, etc.) should be related to the reduction of pollutants and achievement of water quality goals. The effectiveness of the BMP in reducing pollutants should be fully evaluated in terms of the selected criteria.

The reduction or elimination of pollutants in the runoff, seepage, and percolation from nonpoint sources can materially contribute to the protection of the quality of the Nation's waters. In general, there are two options for accomplishing the needed reductions and/or eliminations, namely; (1) Collection and treatment of the pollutants and, (2) reduction and/or prevention of the formation, runoff, seepage, and percolation of the pollutants.

Collection and treatment of the runoff, seepage and percolation of pollutants from nonpoint sources may be necessary in some cases. However, the collection and treatment of pollutants from nonpoint sources is generally complex and expensive. Because of this, collection and treatment is considered to be a final measure to be utilized where other preventive measures will not reach the necessary water quality protection goals.

The BMP must be technically capable of preventing or reducing the runoff, seepage, or percolation of pollutants. First consideration should be given to those preventive techniques that have been shown to be effective during their past use. New and innovative techniques should be fully analyzed as to their technical capability of preventing or reducing pollutants prior to their consideration for incorporation into the BMP.

While one practice (measure) may be adequate in some cases, BMP will generally consist of a combination of practices. The various alternatives should be fully evaluated. In choosing among the alternatives, the BMP that most effectively achieves the desired level of water pollution control should be chosen. If more than one alternative will achieve the level of effectiveness necessary to reach water quality goals, the least costly alternative should be chosen.

## D. A BMP should be "practicable"

Implementation of the BMP should be feasible from not only the technical standpoint but also the economic, legal, and institutional standpoints. The practicality of securing early implementation should be evaluated in the selection of the BMP.

The primary goal of BMP is the protection of water quality. However, expensive preventive techniques that will result in little water quality benefits should be avoided. The BMP must be capable of being implemented within the financial capability of the area, and of the owners or operators of the various sources. Side benefits as well as the installation and operational costs should be included in the evaluation. The final selection of the BMP should take into consideration both the costs of the preventive techniques and the economic benefits (water quality or otherwise) to society that will result from their use.

A number of the preventive techniques that may be incorporated in the BMP are already in widespread use within various source categories. These techniques should receive first consideration in the selection of the BMP. Techniques that will require material operational changes in the source management should be avoided unless they are necessary for water quality protection. Insofar as is possible, the initial implementation of the BMP should be accomplished with the existing legal and institutional framework of the State. However, if additional legal authority is needed, steps should be taken at an early date to secure the needed authority.

Full consideration should be given to the total effect on the environment in the selection of the BMP for water pollution control. BMP applied to prevent or reduce water pollution could result in adverse effects on the other portions of the environment such as the creation of air pollution or solid waste disposal problems. Adverse effects on other portions of the environment are not only undesirable but also will delay the implementation of BMP to control water pollution.

### 1.5 Sources of Information on Techniques

In general, a great body of knowledge concerning the management techniques already exists in the manual and other publications of various Federal, State and local agencies currently operating programs related to the nonpoint source field (e.g., the U.S. Soil Conservation Service and various Soil Conservation Districts manuals and publications; the manuals and other publications of the U.S. Forest Service). EPA encourages the use of such techniques once they have been reviewed and evaluated, and found to have a significant favorable impact on the ecological quality of the waters of the Nation.

Such information will be supplemented, by EPA and other Federal agencies, as additional knowledge becomes available.

In those areas where organized bodies of information do not exist (e.g., urban drainage), EPA is to provide potential users with as much information as is possible regarding state-of-the-art techniques for control.

## 1.6 Source Category BMP

Information on BMP as applied to a source category is contained in the BMP papers that follow.

**DRAFT**

12 FEB 1976

# BEST MANAGEMENT PRACTICES
# URBAN RUNOFF SOURCES OF WATER POLLUTION

Urban runoff pollution is the result of precipitation washing the surface of a city--the pollution associated with this runoff being inevitably a consequence of human activity. Urban runoff contributes significant amounts of pollution to receiving water. These sources may be either point or nonpoint, or combinations of the two. In meeting this problem, this guidance is intended to provide information regarding the management of pollution from urban runoff and to supplement information regarding control of urban runoff under NPDES requirements.

## Introduction

Pollution from urban runoff occurs when precipitation flushes the urban environment and carries pollutants to receiving waters. As surfaces are flushed, the polluted water flows overland toward the collection systems. The initial collection systems are the land surface, roof tops, parking lots, and the like, which slope toward secondary collection systems (roadways, streets, gutters, and drains). It is there that surface water concentrates as it flows into the sewerage. These systems are of two general types: seperate or combined. Separate storm sewers carry, in addition, untreated municipal and industrial wastewater. On the other hand, separate storm sewers discharge directly other hand, usually have flow-splitting devices which, during high flows, bypass a high percentage of untreated combined sewage directly to the receiving waters. The remaining smaller fraction receives some treatment before being discharged.

Polluted runoff contains substantial amounts of organic material, inorganic solids, and coliform bacteria. Other pollutants include nutrients, pesticides, and heavy metals. Clearly, these pollutants degrade the receiving water quality. This degradation often results in decreased dissolved oxygen levels and high turbidities. Coliform bacteria, indicate the presence of pathogenic bacteria which are pollutants. Moreover, nutrients, in the form of nitrogen and phosphorus, contribute to increased eutrophication rates. Although runoff contains pesticides and heavy metals, their impact on the aquatic environment is as yet largely unknown, though recent evidence suggests that the presence of heavy metals decreases the diversity of aquatic biota.

Problems related to water quality degradation resulting from unregulated, or poorly regulated runoff are accelerated erosion of land area and stream banks, sediment deposition in channels, increased flooding, increasing potential for public health problems and deterioration of aesthetic quality. Indeed, the total pollutant loads of stormwater, during storm runoff periods, can exceed by many times that of municipal treatment plants. This condition could very well preclude meeting water quality standards--regardless of the degree of treatment afforded dry weather wastewater flows.

## Nature of the Problem

If one word can describe the nature of the urban runoff problem, that word would be variability. For example, the quantity and quality of storm overflows can vary with respect to storm characteristics, antecedent conditions, time, location, degree of urbanization or even other factors.

While stormwater runoff problems may be characterized by their variable nature, the ultimate cause of this pollution may be traced to the activities of man. Four examples are:

1. Fallout from the Air- Fallout or washout from the air contributes substantial amounts of particulate matter. Winds carry dust and dirt into and out of an area, but leave large amounts trapped within the area.

2. Residue from Transportation- Automobiles, trucks, and buses remain a major source of suspended solids, chemical oxygen demanding material, and heavy metals, especially lead.

3. Debris from Man's Carelessness- Street litter--an accumulation of trash--is a major source of organic material.

4. Washoff from Construction- Runoff from urban construction sites, whether it is from new developments, or redevelopment, contributes significant amounts of sediment.

Sediment remains the most common pollutant which results from these activities. It exists ubiquitously in an urban area. Recent evidence indicates that heavy metals, nutrients, and some pesticides may adsorb or cling to sediments.

## Concept

The object of nonpoint source controls is to protect the beneficial uses intended for receiving waters. While treatment appears an available means to achieve this end, its cost remains prohibitive. A less costly alternative is, then, to address the sources and causes of pollution. Best Management Practices achieve this goal through the reduction and prevention of pollution. Such is the principal focus of the BMP concept.

Management practices may be divided into two groups: those most useful for existing or developed areas and those more applicable to new or developing areas. Problems of developed areas occur where structures and pavements are in place and where drainage is accomplished primarily through sewering. In the densely populated commercial, and industrial subareas, management techniques such as improved sanitation practices and improved maintenance practices are most effective. Such techniques reduce the amount of pollutants, that can enter the drainage system.

The "preventive" concept best applies to developing urban areas, for these are areas where man's encroachment is minimal and drainage is essentially natural. These areas offer the greatest flexibility of approach in preventing pollution. What is required, therefore, is to manage the development in order to maintain a runoff regime as close to natural as possible. It is in these new areas where proper management practices can prevent long term problems.

The philosophy of flow attenuation underlies the preventive objective of the BMP concept. Flow attenuation, as an approach to controlling the rate of urban runoff, is well documented. It is concerned directly with runoff as it moves over the surface of the urban area to the initial collection system. Flow attenuation, in an hydrologic sense, means to increase the time of concentration and decrease the magnitude of the peak runoff. Less erosion results because reduced runoff velocity reduces the erosion force. Furthermore, with this technique large volumes of water are not allowed to rapidly accumulate at constructions, but flow at reduced rates over a longer period of time, thus diminishing the possibility of localized flooding. Management practices focus on the sources of pollutants and their means of conveyance. The improvement to water quality is a result of reduced loadings to the receiving water.

ment to water quality is a result of reduced loadings to the receiving water.

## Management Options

Best management practices, within the urban area, are an integrated approach using source and collection system management. Source management is defined here as those measures for reducing or preventing pollution through good "housekeeping" methods. Examples of "housekeeping" techniques are:

1) Street cleaning,
2) Sewer flushing,
3) Catch basin cleaning,
4) Improved waste collection,
5) Stock pile covering.

Source management addresses the pollutants where they accumulate, before they are washed into the receiving water.

Collection system management, as used here, includes all alternatives pertaining to collection systems which begin from the ground surface and end with the sewer outfall. Examples include devices such as:

1) Detention basins,
2) Recreation lakes,
3) Debris dams,
4) Playground or parking lot temporary storage,
5) Roof tops, and
6) Use of flow separating devices such as the swirl concentrator,
7) In-systems devices such as
    a. Use of existing sewers for storage
    b. In-line tunnels
    c. Addition of polymers
    d. Inflow/infiltration reduction, etc.
8) Groundwater Recharge

Collection system management is concerned with reducing the amount and rate of runoff and in addition, the number of overflows in combined sewers.

Reuse of stormwater should be considered as a management option in those areas of the country that are water deficient. Runoff, from surface storage, can be used for such nonpotable uses as fire fighting or lawn irrigation. Groundwater recharge should be considered where it is practicable, and the quality of the recharging water would not pollute the receiving aquifer.

An integrated approach would include source management to reduce pollutant loads and collection system management to reduce infiltration, overflows, and rate of runoff. BMP's should thus stress both source and collection system management. The management goal is to reduce or prevent pollution in order to meet water quality objectives at a minimum cost.

Developed areas are subject primarily to housekeeping type techniques --reduction of loadings being accomplished by actual sweeping after the fact. Preventive approaches such as increasing percolation into the soil, and attenuating runoff through surface storage, are possible and should be considered when redevelopment occurs. The highest degree of flexibility of approach and probability of sucess is in the developing areas as control can be built into the project. The opportunity to contain the urban runoff problem and avoid long term problems is such that high priority should be given to planning and implementation of management programs in all areas.

## Information Sources

Information on load estimating, management techniques, and technology assessment for the reduction and prevention of pollution from urban runoff can be found in the following publications:

1. "Interim Report on Loading Functions for Assessment of Water Pollution from Nonpoint Sources", EPA-Project #68-01-2293, U.S. Environmental Protection Agency, Washington, D.C., 20460, November 1975.

2. "Water Quality Management Planning for Urban Runoff", EPA-440/9-75-004, U.S., Environmental Protection Agency, Washington, D.C. 20460 December 1974.

3. "Practices in Detention of Urban Stormwater Runoff", Herbert Poertner, Office of Water Resources Research and Technology, U.S. Department of the Interior, Washington, D.C., June 1974, NTIS order number: PB 234554.

4. "Water Resources Protection Measures in Land Development - A Handbook", Office of Water Resources Research and Technology, U.S. Department of the Interior, Washington, D.C., April 1974, NTIS order number: PB 236049.

5. "Urban Stormwater Management and Technology - An Assessment", EPA-670/2-74-040, U.S. Environmental Protection Agency, Washington, D.C., 20460, December 1974.

DRAFT
31 JAN 1976

# BEST MANAGEMENT PRACTICES
# TO MINIMIZE WATER POLLUTION DUE TO RESIDUAL WASTES

The other nonpoint source categories of agriculture, silviculture, mining, construction, urban runoff, and hydrologic modification often produce residual wastes through their activities. These discarded materials must be properly handled to provide for our health and environmental protection. Our choices in problem solution are limited. Wastes may be disposed of, recovered for some use, or reduced at the source of generation.

Millions of tons of residual wastes are disposed annually, generally by burying or burning and burying; this results in various degrees of environmental harm to air, land and water. Surface and ground water damage result when the pollutants from these residual wastes are conveyed to waters by run-off and infiltration. Using the residual waste generated by wastewater treatment plants as a base factor of one, residential and commercial sources generate about 17 times as much waste as generated by wastewater treatment plants, and industry produces about 35 times the base amount. Agriculture produces 2 1/2 times the waste produced by industry, and mining produces 7 times that amount.

The following guidance is intended to provide information regarding the control of pollution from nonpoint sources of residual wastes and to supplement information regarding control of residual waste pollution associated with discharges regulated under the requirements of NPDES.

## Introduction

Residual wastes are defined as those solid, liquid, or sludge substances from man's activities in the urban, agricultural, industrial, and mining environment not discharged to water after collection and necessary treatment. Residual wastes include, but are not limited to:

- Sludges resulting from water and domestic wastewater treatment, industrial processes, utility plant processes and mining processes;
- Solids resulting from industrial and agricultural processes and from nonprocess industrial and commercial activities (demolition wastes, mine tailings, incinerator residues, dredge spoil, crop residues, feedlot wastes, and pesticide containers);
- Liquids resulting from industrial side streams and from agricultural product processing.

Residual wastes must be considered as largely untapped resources with unrealized potentials for beneficial uses. The minimal use of residual wastes has primarily resulted from the traditional consideration of such wastes as a problem rather than as potential assets. The ocean and land have been the final resting places for societies' residues, because they have been the most economical. This attitude has resulted in dumps with few siting considerations, a lack of site maintenance and no emphasis for resource recovery.

As treatment requirements become more stringent with further implementation of the Federal Water Pollution Control and Clean Air Acts, residual wastes will greatly increase and will contain a wider range and greater concentration of pollutants.

Management programs for handling vast quantities of residuals often fall short of providing adequate protection of water quality. Frequently, procedures intended to abate air and water pollution problems worsen residual waste problems. Since residual wastes are the end-product discards of all processes, the management of residual wastes clearly cannot continue to be considered separately from the overall management processes and systems that produce the wastes. Just as the environment -- air, water and land -- must be considered a continuous whole, and be treated as such, residual waste problems cannot be successfully segregated into individual components for separate particularized handling. All considerations must be integrated into a problem-solving approach that will achieve total waste management, on an areawide basis, with emphasis upon (1) recovering the resource values contained in any such wastes, and (2) the satisfactory, sanitary disposal of any element or portion of the residual wastes not amenable to resources recovery processing or without economic value for such processing.

## Identification of Pollutants

The types of wastes and their composition have changed greatly over the past three decades, due largely, to changes in lifestyle and to the great diversity of new products on the market. The wastes society generates are conveniently classified into hazardous and nonhazardous. The biological, chemical, and physical actions of the environment can, with unacceptable control measures, act on these residuals to release their hazardous and undesirable constituents to the environment.

Water quality problems which can result from the released waste constituents exceeding the assimilative capacity of the receiving water include: aesthetic deterioration, dissolved oxygen depletion, bacteria/virus contamination, suspended solids, dissolved solids, nutrients, and metals/pesticides/persistent organic toxic compounds. All of the above problems are directly or indirectly associated with precipitation, which provides mobility to the waste constituents.

For the most part, nonhazardous residual wastes are a local or regional problem. The Federal role has been to identify and test possible solutions, with State and local governments responsible for implementation. Hazardous residual wastes are a problem of national scope, with Federal laws controlling the storage and disposal of waste pesticides and containers, and radioactive wastes. This limited Federal authority leaves many gaps in the disposal of hazardous wastes.

## Concept of Best Management Practices

While the residual waste situation is technologically, economically, governmentally and socially complex, it can be made to succumb to a sound, results-oriented program of conceptualization, investigation, analysis and evaluation, planning and programming and (most importantly) the exercise of capable leadership and strong resolve to implement areawide programs and systems.

This approach infers that residual waste problems can best be corrected by the implementation of Best Management Practices (BMP) which can be expected to result systematically in flow attenuation of waters, waste stabilization, waste reduction, and resource recovery and recycling. BMP approaches cannot be established and utilized individually, but must be integrated into an overall system for the effective management of residual wastes. Everything works interdependently. Flow attenuation, while reducing entrained run-off pollutants, can actually increase infiltration and increase the requirement for waste stablization. Reducing wastes at the source by preventing the production of wastes, and, at the disposal end, through the resource conservation can either eliminate the residues from many manufacturing processes, before they appear as wastes, or prevent the residuals from coming into extensive, dis-beneficial contact with the environment.

## Management Techniques

Many techniques can be applied to the management of residual wastes, and the alternatives can be divided into two general categories:

(1) Innovation. This would include, particularly, the development of source reduction techniques (basically administrative) and systems for the recovery or recycling of residual wastes (basically technological and institutional). Reference must be continually made to the total waste management system, including in-process treatment, or containment procedures.

(2) Application of existing techniques. This would involve the utilization of demonstrated state-of-the-art techniques to remedy problems; basically, this would be an extension of the present process.

A BMP might be included in either of the above categories. However, EPA encourages the first: innovation. Over the long term, the innovative approach will result in accomplishing the greatest source reduction and the greatest recovery of resources, as well as the abatement of pollution. Actually, pollution abatement is achieved almost as a by-product of the innovative process.

However, both approaches are equally amenable to standard administrative and regulatory practices. The end goal of the approach should be to provide sufficient reduction in pollutants to enable the meeting of designated water quality objectives at minimum cost.

Any BMP should consider that cost considerations are vital and that treatment alternatives will be used only when lower cost alternatives fail to provide the required reduction in pollutants. The greatest degree of freedom in alternative selection will be under new source conditions where existing decisions and capital investments will not be overriding factors. These new source condition controls will permit the greatest short-term accomplishment. The implementation of BMP's under existing source conditions cannot be accomplished overnight. The key to successful existing condition control is orderly transition. It is necessary that any action be phased in over time in such a way that adverse consequences are minimized or eliminated. The BMP concept must recognize that capital investments and individual's jobs must be counted and no change should be implemented until all the benefits and costs have been weighed. These criteria must be weighed against the urgency of water quality requirements and objectives, which are insistent that certain ameliorating actions be taken.

Solutions, under a BMP, should be directed toward meeting the following key needs:

- the need to design a workable, flexible system;
- the need to use, establish, or modify appropriate institutional arrangements (laws, organizations, processes);
- the need to reduce uncertainties, promote actions to implement;
- the need to establish a sense of urgency, improve schedule;
- the need to establish a process of continuous improvement through research and development in the local area;

- the need to help people get started on a coordinated basis -- incentivization;
- the need to give adequate attention to all public information and education programs.

Any BMP must meet certain general and specific criteria. General criteria are provided in the States Water Quality Management Guidelines. The specific criteria for a residual waste BMP follow:

## Geographic Situation

The geology of our country can vary widely over short distances, resulting in numerous soil types and hydrologic profiles. Residual waste disposal and use alternatives must consider these variables as they determine the mobility of waste components in this underground portion of the environment. Topography of the sites (terrain slope, type of surface covering and distance between surface hydrological features) affects waste component mobility. The BMP must examine these variables to prevent waste from being transferred between environmental structures, ultimately impacting water quality objectives.

## Meteorological Conditions

The frequency, intensity, and duration of precipitation within and outside of the site will affect the surface water infiltration and material deposition and movement. Precipitation can be in a number of forms, but rain and snowmelt account for the major volumes. The ambient temperature can determine the rate of snowmelt and the biological activity of a site. The absolute humidity as it affects biological activity and physio-chemical alterations of nonconservative waste components can make new products that are more or less environmentally toxic and mobile than the parent material. As meteorological activity can directly affect water component mobility, the BMP must be compatible with these environmental influences.

## Demographic Conditions

The practicability of certain BMP's can depend upon high densities of population or industry(ies) being present or absent in a given area. Frequently, there are critical limits at which resource recovery and waste reduction become feasible alternatives. Also, as mentioned earlier, capital investment and individuals' jobs must be weighed when considering implementation of a given BMP.

## Socio-Political Infrastructure

The BMP must address more than the residual wastes, their composition and their movement, and the technical or technological problems of their management. Any waste management system that is handling a problem as pervasive as the management of residual wastes must be inlaid into a socio-economic and socio-political "envelope" that has its own problems in dealing with the type of management system that will ultimately emerge for the management of residual wastes. These problems will include the development of areawide (regional) resolve to implement, and a structure and process through which management may be exercised. Developing these programmatic elements in the face of interlocal/intergovernmental political and economic rivalries, and the social differences that may occur within a given region calls for the development of new patterns for working together, new programs for promoting public understanding and reducing public apathy, and the devising of such instruments of public policy as strong local and State legislation to establish viable structure and process and reduce marketing uncertainties.

The following specific examples of alternative strategies are provided for planning purposes only. They are not recommendations. Use of any one or more of these specific examples should be based upon a comprehensive, areawide, interdisciplinary investigation and the development of specific recommendations from the data.

## Source Reduction

The source reduction strategy involves techniques which are basically legislative and administrative in nature. Examples include:

- Design and use of products that live longer.
- Design and use of products which have less material weight.
- Monetary incentives (beverage container deposits).

## Resource Conservation

Source Separation and Centralized Processing. The source separation strategy involves a system of low technology techniques. Examples include:

- Separation of waste materials in the home.
- Separation of waste materials at commercial establishments.
- Separation of waste materials at industrial establishments.

The centralized processing strategy involves high technology, capital-intensive systems. Examples include:

- Fuel (solid, gas, liquid) and material (ferrous and nonferrous metals, glass) recovery plants.
- Energy conversion facilities (retrofits, new boilers).
- Material conversion facilities (de-tinning plants, minimills, glass products plants, smelters).
- Transportation systems.

## Disposal

The disposal strategy generally involves low-technology systems. Examples include:

- Construction and demolition waste;
- Lined lagoon and landfill
- Waste stabilization:
- Landfill stockpiling for potential future recovery.

## Information Sources

EPA has published numerous reports describing methods for management practices and preventive techniques for the control of residual wastes resulting from man's activities. Many of the practices described above are discussed in some detail in the following publications. This listing is by no means exhaustive and the user is encouraged to look further.

- Residual Waste Management Research and Planning Projects, EPA-WPD 09-75-01, September 1975.
- Sludge Processing, Transportation and Disposal/Resource Recovery: A Planning Perspective; EPA-WPD 12-75-01, December 1975.
- Interim Report on Loading Functions for Assessment of Water Pollution From Nonpoint Sources, EPA Project No. 68-01-2293, November 1975.
- Development of Residual Management Strategies EPA 600/1-76-01, January 1976.
- Residual Waste-Best Management Practices Handbook, EPA-WPD 02-76-01, February 1976.

Additional information regarding institutional structures and methods of implementation will be provided in later publications.

DRAFT
DEC 18 1975

# BEST MANAGEMENT PRACTICES TO MINIMIZE WATER POLLUTION DUE TO HYDROLOGIC MODIFICATIONS

## Introduction

Many development activities within planning areas necessitate hydrologic modifications as an essential feature. These include (1) channel modifications; (2) construction of dams to impound stream flows; (3) other types of construction activities; and (4) resource recovery operations actually located in streambeds. In addition, there are many land development activities which, if not properly controlled, may result in unintended, and often undesirable, hydrologic modifications. In many instances these activities result in topographic and ground cover changes which could affect surface runoff rates, volume and direction adversely. Such effects are often experienced in areas undergoing rapid urbanization.

Hydrologic modifications may be of local or regional scope, and are being (or have been) implemented in areas extending throughout the nation, affecting both intra-and interstate waterways.

## Description of Hydrologic Modifications

Hydrologic modifications resulting in nonpoint source pollution are activities that either directly or indirectly affect, or have affected, the natural stream-flow and associated groundwater regime detrimentally. Pollutants are consequently added to the surface and ground waters from the diffuse runoff, or by seepage or percolation. The levels of many of these pollutants are influenced by climatic events such as rainfall and the seasonal temperature changes, in addition to the effects of soil types and topography, and operating practices. Reference to hydrologic modifications as sources of non-point pollution should not be mis-construed as eliminating them from consideration as point sources with respect to certain aspects, which require control under the NPDES and 404(e) permit programs.

## Channel Modifications

Channel modifications are implemented primarily for flood control, erosion reduction or for drainage purposes. Such structural changes as dikes, levees, piers, docks, bridges and road fills may require or result in channel modifications which would not otherwise have occured. There are seven different types of modifications which are potential nonpoint sources of pollutants. They are:

1. Clearing and snagging operations to restore the former hydraulic capacity of a streambed. This is basically a periodic maintenance operation.
2. Channel excavations which enlarge and reshape an existing channel, or which provide a new channel in its place.
3. Channel realignment to eliminate meanders that have developed in the natural streambed.
4. Construction of floodways to relieve the streambed of excessive flows of storm water. These are normally dry.
5. Construction of retarding basins for the temporary storage of excess flows of storm water.
6. Construction of debris retention basins to hold back debris during periods of high water, which might otherwise result in extensive downstream erosion and pollution.
7. Construction of drainage ditches or deepening existing ditches.

## Impoundments

Dams are constructed to impound surface waters for water supply, flood control, fish and wildlife, hydropower, navigation, irrigation, flow diversion, low flow augmentation, and combinations of some or all of these reasons. They are usually assigned to one of the two following categories:

1. Run-of-the-river impoundments, which characteristically have low heads and water detention times limited to a few days.
2. Storage reservoirs, which are usually located on tributaries, with high heads, and encompassing an extensive area outside the original channel.

## Various Construction Activities

All types of ground-disturbing construction activities result in modifications to existing drainage flows, and if not given adequate design consideration, such hydrologic changes may become sources of water pollution. Construction nonpoint sources of pollution are the subject of a separate guidance document, and will not be covered here in detail. When a construction project includes potential nonpoint sources resulting from hydrologic modifications, those best management practices recommended in that document need to be implemented.

## Resource Recovery Operations

The resource recovery activity of primary importance is that of the sand and gravel operation. However, mineral recovery operations of any kind which will disturb the existing streambed must be considered, as well as should oil and gas wells (exploratory and production), located in bodies of water.

## Withdrawal and Recharge Activities

Surface and ground water withdrawal and recharge activities may produce undesirable effects such as reducing waste assimilative capacity, damage to fisheries, saltwater encroachment, surface subsidance, induced recharge, and mixing of water in aquifers of differing water quality.

## Other Types of Activities

Concurrently prepared best management practices guidelines are available for activities incorporating hydrologic modifications in agriculture, silviculture and other categories, in addition to construction. However, best management practices should be applied for all other activities involving hydrologic modifications, even if they are not specifically identified by guidelines.

## Identification of Pollutants

Six general types of nonpoint source pollutants that result from hydrologic modifications are:

1. Sediment- Sediments are one of the most prevalent non-point source pollutants, occurring as a result of most types of hydrologic modification activities to varying degrees. The degree of pollution from sediments will vary with streamflow, snowmelt and rainfall runoff, soil types, and bedload characteristics, and will be most intense during the period when construction activities have removed vegetative cover, until it can become re-established. Since they are a naturally occuring phenomenon, present due to erosional processes, they will normally be evident to some degree even with application of best management practices to control manmade sources. Where the sediments settle, bottom organisms can be smothered, and spawning beds can be destroyed. The increased turbidity during the transport phase will interfere with ligh penetration, hindering photosynthesis, and is a hazard to boaters, swimmers and water skiers. Sediments are also carriers of nutrients and pesticides which may have become adsorbed to their surfaces.

2. Nutrients-Where Hydrologic Modifications located in agriculture-intensive areas result in increase runoff rates and streamflow velocities, the natural level of nutrients may be increased. In urban areas, similar circumstance will increase nutrient levels as a result of fertilization of lawns and gardens, but the amount of increase will be lower. Soil erosion also contributes to the problem by carrying adsorbed nutrients well beyond the areas that would normally be affected.

3. Pesticides- A similar pollution problem may be experienced with respect to pesticides as was described for nutrients, unless integrated pest management has been instituted.

4. Thermal- This form of pollution may result from channel modifications or impoundment construction. Not only is the temperature change that might occur a problem by itself with respect to sensitive aquatic life, but it can lead to serious changes in the dissolved oxygen level in the water body. As an example of the type of problem that might be experienced in channel modification, if the normal tree cover is removed, and the channel is widened to handle design flood flows, the resulting shallow normal flow will be exposed to increased solar radiation, with attendant temperature increases, and a reduced capacity for dissolved oxygen. Impoundments that become stratified during the summer and winter may become oxygen deficient, which can, in turn, cause low dissolved oxygen problems downstream of the discharge.

5. Chemicals - Hydrologic modifications such as dredging, with the attendant necessity to suitably dispose of the spoil, may result in release of pollutant chemicals from the spoil through leaching or percolation. The fines re-suspended in the streambed are another potential source of pollution if adsorbed chemicals are released. Changes in pH and dissolved oxygen levels that may occur in impoundments may cause release into solution of certain types of chemicals previously insoluble. Modifications that lowered the groundwater table sufficiently in coastal areas could result in saltwater intrusion into a freshwater aquifer, with attendant salinity degradation.

Chemical stabilization techniques applied for control of fugitive dust and/or nonpoint source pollution will require coordination. Techniques selected must be complementary, rather than conflicting, with the choice of action selected being that which produces the best total end result, with respect to control of both nonpoint source pollution and fugitive dust.

6. Microorganisms - Modifications could result in pathogenic microorganisms entering the water from runoff or percolation and seepage. Changes in the existing flow regime must consider the effect on potential sources of such organisms.

## Considerations For Best Management Practices Selection

Best Management Practices for hydrologic modifications is the most practical and effective measure, or combination of measures, which will prevent or reduce the generation of pollutants, upon implementation, to a level compatible with water quality goals.

The BMP selected for a specific hydrologic modification will not necessarily be the same in different areas of the country. Soil types, topography, climate, existing condition, local zoning and land use regulations, etc., must be considered in assessing the problem. The final determination of which BMP alternatives to apply in any specific case must suit the site conditions, and include appropriate public participation. BMP must be considered at the earliest stage practicable, and throughout the problem identification and analysis planning, design and construction phases.

The principal emphasis should be placed on measures that will prevent, or minimize nonpoint source pollutants which would be generated by the specific hydrologic modification. All preventive measures must be fully integrated into the total management system for every hydrologic modification. In brief, the changes introduced should produce conditions similar to those existing in nature which past experience has proved will effectively control the potential pollutants, and maintain or improve the water quality, while avoiding changes which would be detrimental.

As in other areas of nonpoint source pollution, erosion control measures are an essential feature of most hydrologic modifications. Controlling sediment-bearing runoff will reduce the amount of adsorbed nutrients, pesticides and other chemicals that reach the nation's waters. Designs for modification must recognize this problem and provide suitable construction provisions as a part of the project. (With respect to pesticides, integrated pest management must be given suitable consideration.) Subsequent operation and maintenance activities must continue to apply best management practices to assure the continued success of the pollution prevention measures.

The potential for thermal pollution problems must be assessed for some types of hydrologic modifications, and suitable control measures must be applied. The choice of type of modification may even be determined by the need to control pollution of this type.

## Prevention and Reduction Measures

The measures which can be applied to hydrologic modifications to prevent or reduce pollutants from reaching surface or ground waters may be vegetative, structural or institutional or a combination, in addition to those mentioned for agriculture, silviculture, etc., in the documents developed for pollutants related to those activities. Institutional measures relating to land use should not be overlooked, but will be more easily applied in non-urbanized locations. The variety of structural and vegetative control measures will be discussed in detail in applicable sections of this handbook.

# DRAFT

1 8 DEC 1975

## BEST MANAGEMENT PRACTICES
## MINING NONPOINT SOURCES
## WATER POLLUTION

Mining activities in the United States have affected approximately 13 million acres of land according to estimates by the U. S. Department of the Interior. This acreage includes almost 7 million acres which have been undercut by mining activities, and more than 3 million acres disturbed by surface mining activities. The remaining acreage represents land used for containing mining-related mineral waste accumulations. By the year 2000, the Department of the Interior estimates that 30 million acres will be affected by mining operations. While the land area presently affected by mining represents only about 0.5% of the United States, the effects of mining upon water quantity and quality are spread over large regions.

### Introduction

Pollution from mining operations arises because the hydrology of surface and subsurface waters is altered when the earth's crust is disturbed to gain access to mineral values held within. The quality of these waters very often deteriorates, and the quantity is often redisturbed as a result of mining operations. Water quality deteriorates when water supplies are contaminated with soluble products present in or generated from mining wastes. Water quantity is affected because natural drainage patterns for surface and subsurface waters are altered. Any disturbance of the earth's crust will alter the environment in the vicinity of the disturbance. The degree to which the environment is altered depends upon the size and depth of the disturbance, the method of the disturbance, and the nature of the disturbed materials. The purpose of disturbing the earth in mining is to extract mineral deposits. Methods used are determined by the placement of the minerals in the earth. Similarly, size and depth of the mine are determined by the distribution of the mineral at the mining site.

The extraction of minerals from the earth's crust can be accomplished by a variety of techniques. For minerals deep in the earth, mine shafts are sunk to gain access to the deposit. This method is usually not used if mineral deposits are available for recovery by surface mining techniques. Underground mining techniques tend to retrieve most of the values in the deposit compared to surface mining techniques.

Surface mining creates more visible defacement of the earth's surface, and results in disturbance of large land curves.

DRAFT
18 DEC 1975

The most serious pollutant arising from mining activities is the mine drainage generated by oxidation of pyritic materials with air in the presence of water; this drainage is an acidic mixure of iron salts, other salts and sulfuric acid. Mine drainage arises from both underground and surface mining sources, and from coal and many metal mining operations. Coal deposits and so-called hard rock mineral deposits are commonly associated with pyrite and marcasite, which are disulfides of iron. Acid mine drainage can find its way into surface waters, where the acid and sulfate may result in severe deterioration in stream quality. The acid can react with clays to yield aluminum concentrations sufficient for fish kills, and with limestone to yield very hard waters expensive to soften. The acid can also selectively extract heavy metals present in trace quantities in mineral and soil formations, resulting in toxic conditions in lakes and streams.

Mining refuse waste materials left near the mining site after raw minerals have been cleaned or concentrated is another source of pollution. Much of this refuse contains pyritic material which can be oxidized to acidic substances. The resultant acid water may remain in the pile until a rainstorm, at which time it is flushed into nearby watercourses. Mine drainage "slugs" during storms are very detrimental to aquatic life in surface waters.

Mining operations also generate wastes, commonly called spoil, in the form of disturbed rock and soil. If this spoil is left in piles, erosion and runoff will carry sediment into streams. This sediment is capable of destroying life in streams, results in decreased capacity of streams and reservoirs, and destroys fish and wildlife habitats.

Improperly impounded sediment may be released suddenly as a mud slide and thus poses a direct threat to life and property.

Mining activities have a pronounced effect on groundwater supplies. The various operations used to mine the mineral deposits can result in alteration of groundwater distribution patterns. Aquifers containing good water can become contaminated because some mining may disturb bedrock formations, which permit mixing of contaminated water with good.

## Description of Mining Pollution

Water pollution caused by drainage from mining activities occurs when dissolved, suspended, or other solid mineral wastes and debris from mining and related operations enter receiving streams or ground water. Mine drainage includes both water flowing by gravity or pumped from underground mines, and runoff or seepage from surface mines and from excavated waste materials. Polluting drainage is often corrosive, highly mineralized, toxic to aquatic life, and may be laden with chemical and/or soil sediments.

Pollutants may be generated during all phases of the mining cycle whether the commodity is coal, sand and gravel, uranium, metallic ore or nonmetallic ore; exploration, development, mine operation, closure, and reclamation. In many cases, water pollution can continue long after a mine has ceased operation. Pollution caused by inactive or abandoned mines ("orphans") presents special problems of abatement.

Mine drainage pollutants include such dissolved and suspended constituents as acid, alkali, iron, copper, arsenic, cadmium, nickel, phosphate, sulfate, chloride, radioactive minerals, sediment, and colloidal contaminants. The acids, alkalies, metals, and other minerals in mine drainage affect water quality and water use in various ways. To many the most dramatic effects of mine drainage pollution are the destruction of fish and other aquatic life and impairment to aesthetic features. Mine drainage pollution may affect the use of water for municipal, industrial and agricultural water supply by increasing the costs for water treatment.

## Identification of Sources of Pollutants

Various active unit operations within a surface or underground mining operation produce pollutants that can ultimately enter both surface and ground waters causing a lowering of water quality. The discharge of pollutants from certain of these unit operations have been classified as point sources by EPA, and certain of them have been classified classified as nonpoint sources. Inactive and abandoned mine sites can be considered nonpoint sources.

Nonpoint pollution from mining activities are strongly dependent on precipitation events although there may be a significant response delay when the ground water is the source of seepage water. The sources may be intermittent or continuous in nature. The nature and amount of pollutants are dependent on such factors as soil type, topography, geology, method of mining, and hydrologic characteristics of the site.

## Mining Activities

The basic mining activities that are potential causes of nonpoint pollution sources are:

Exploration is conducted to locate a seam or other economic deposit and to obtain quantity/quality data on that deposit. Site access, excavation, and drilling activities can cause surface denudation and erosion, mineralized ground water discharge, leaching of exposed mineralogic materials, and chemicals seepage or release.

Construction of the mine and support facilities including roads can be a major generator of pollutants.

Runoff and seepage of ground or surface waters may contact mineral matter exposed by the operation and result in mineralized drainage. Slides of unstable spoil piles or disturbed steep slopes can occur causing further landscape and stream damages.

Following the mining operation the improper sealing of underground mines as well as unsucessful revegetation and reclamation of inactive surface mines.

Pollutant Generation and Their Causes

Land disturbed by surface mining is a major source of sediment in mining regions. Studies have shown that erosion and sedimentation rates on strip-mined land are 500 times as great as those on neighboring land that has not been stripped. Overburden dumped on the downslope areas is one of the largest sources of sediment. The post-operative mining period can be the period of most severe erosion. When eroded sediment is transported to a receiving stream it can smother bottom organisms, interfere with photosynthesis by reducing light penetration, and contribute to flooding by filling stream channels.

Acid mine waters result from oxidation of pyrite and other iron-bearing minerals in deposits of anthracite and bituminous coals. The reaction of these exposed sulfur-bearing minerals (usually sulfides) with atmospheric oxygen and water frequently forms a sulfuric acid solution that reacts with soil and rock materials to leach out other pollutants, commonly metals. The acidic water can be toxic to aquatic life and corrosive to manmade structures.

Dissolved minerals contained in mine waters can be present in sufficient concentrations to be toxic to aquatic life. Heavy metals such as copper, nickel and zinc may be present in toxic concentrations, as well as chloride, sulfate, or other troublesome ions. Even though one or more constituents is not present in toxic amounts considered singly, toxic conditions can result from synergestic effects among various constituents.

The total mineralization, total dissolved solids content, of a water can present a salinity problem. It normally occurs when salts contained in geologic formations are penetrated by mining and the resulting saline mine runoff waters enter into receiving streams or ground waters. Aquatic life can be harmed and expensive treatment may be required for certain uses of that water.

DRAFT
18 DEC 1975

The control of water pollution from mining activities is achieved through proper operational management and utilization of preventive techniques, and by mine water treatment. Control of mining nonpoint pollution sources is best achieved through prevention or avoidance. The utilization of preventive and management techniques is the primary thrust for the control of nonpoint mining pollutants.

There are four premises upon which mining pollution control of nonpoint sources is based:

1. That any disturbance of the earth for mineral extraction alters the hydrologic environment to form some amount of water pollutants;

2. That each mine site represents a unique set of chemical/physical and hydrologic conditions;

3. That effective and efficient environmental protection from mining impact requires a total mining plan before extraction occurs that covers management control and preventive measures implementation throughout the mining cycle. Thus, the plan must cover activities initiated and implemented during the pre-extraction and extraction phases, and conclude after extraction has terminated and adequate restoration of the site has been accomplished;

4. That a combination of several management and engineering techniques is usually required to effect a complete pollution control plan that prevents or minimizes pollutants reaching ground or surface waters.

## Basis For Best Management Practices Development for Mining Activities

"Best Management Practices" (BMP) means a practice, or combination of practices, that is determined after problem assessment and examination of alternative practices, to be the most effective, practicable (including technological, economic, and institutional considerations) means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals.

Best Management Practices for mining activities are the most practical and effective measures, or combination of measures, which when applied to a mine production site, will prevent or reduce the generation of pollutants to a level compatible with water quality goals.

Each identified BMP will differ with the kind of mining, geographic area and conditions, and the extent and age of the mine. A new mine may have a different BMP than an older mine in the same locale. BMP judgements for any specific site will recognize special problems such as poor soils, unstable slopes, toxic conditions, and unfavorable geologic structure. Existing regulatory requirements, future land use, and economic effects will influence BMP developments.

There are a wide variety of measures available that will materially reduce the amount of pollutants generated at a surface or underground mine site. Selection and blending of the appropriate measures through the mining cycle can be categorized in terms of four objectives.

1. Prevention of an increase in the mineralization of the ground or surface waters intercepted by earth disturbance activities:

The quantity and quality of mine water produced can be greatly influenced by various techniques of surface diversion, subsurface dewatering and collection, segregration of toxic mineral matter, and proper management and handling of intercepted water.

2. Minimization of erosion and sediment transport from all surfaces necessarily removed of cover:

Erosion and sediment transport are problems of surface mining and surface facilities of underground mining. Measures to mitigate these phenomena should include grading, compaction, sediment traps and early revegetation of disturbed areas.

3. Careful residuals management of all mining wastes to prevent leaching and erosion:

Measures to control the adverse affects of residual materials stored on the land surface are generally the same as those used in water diversion and erosion control.

4. Prevention of post-operative pollution via proper mine closure and/or reclamation measures:

Mine closure and land reclamation are critical processes in the total mining plan. Closure of underground mines to prevent continued polluting drainage is more difficult than surface activity but a number of sealing and diversion techniques are effective in preventing or reducing continuing problems. A multitude of surface reclamation practices are effective and available. They can be classed as measures to segregate overburden and bury toxic materials, return topsoil, control erosion and sedimentation, moderate topography, stabilize disturbed areas, and permanently revegetate the area.

## Information Sources

EPA has published various reports describing methods for management practices and preventive techniques for the control of pollutants from mining activities. The titles of current publications include:

DRAFT

1 8 DEC 1975

- Processes, Procedures, and Methods to Control Pollution from Mining Activities, EPA-430/9-73-011, October 1973.
- Methods for Identifying and Evaluating the Nature and Extent of Nonpoint Sources of Pollutants, EPA-430/9-73-014, October 1973.
- Analysis of Pollution Control Costs, EPA-670/2-74-009, February 1974.
- Environmental Protection in Surface Mining of Coal, EPA-670/2-74-093, October 1974.
- Inactive and Abandoned Underground Mines, Water Pollution Prevention and Control, EPA-440/9-75-007, June 1975.
- Criteria for Developing Pollution Abatement Programs for Inactive and Abandoned Mine Sites, EPA-440/9-75-009, August 1975.
- Compilation of Federal, State and Local Laws Controlling Nonpoint Pollutants, EPA-440/9-75-011, September 1975.

Additional information on features and design of specific measures is available in the publications and handbooks of other Federal and State agencies and in various mining industry publications.

EPA is committed to the management, prevention and control of pollutants from mining sources. Authority exists under sections 208, 209, 303(e) and 313 of P. L. 92-500 for EPA to initiate a program in conjunction with the States to manage nonpoint sources, although the the primary responsibility for nonpoint source management rests with the States. Establishment and implementation of nonpoint source management programs will be a part of the areawide planning process in designated 208 areas as well as a part of the State water quality management responsibilities in non-designated areas.

Point Sources of Mining Pollutants will be controlled thru the National Pollution Discharge Elimination System Permit Program.

DRAFT
DEC 18 1979

# Best Management Practices Silvicultural Nonpoint Sources of Water Pollution

Silviculture is the cultivation and harvesting of timber for commercial purposes. As such, the term includes all activities related to its purpose from the planting of seeds, through those involved in the maturing of the crop, its harvest and transportation from the growing area. In addition to being performed on approximately 500 million acres of commercial forest land utilized for the continuous production of marketable timber, portions of the overall silvicultural activity take place on a number of lands being transferred from a wooded state to another use.

## Introduction

This guidance is intended to provide information regarding the control of pollution from silvicultural nonpoint sources, and to supplement information regarding control of silvicultural associated discharges regulated under the provisions of the NPDES and 404(e) permit programs.

Silvicultural activities can result in the development of significant sources of pollutants which may reach surface or ground water, most often due to a climatic event, although certain construction or hydrographic modification activities have been recognized under the 404(e) program as being essentially due to a specific activity of man.

While all silvicultural activities are inter-related, those activities producing pollutants can be divided into four classes: (1) Access systems (log roads and other access and transport systems); (2) harvesting; (3) crop regeneration; and (4) intermediate practices and activities. The amount of pollutants generated by these activities are strongly dependent upon the magnitude and characteristics of climatic events, the physical characteristics of the area (soil type, topography, etc. ), and the characteristics of the individual operations as they are practiced in a specific area.

## Description of Silvicultural Activities

The four general classes of activities associated with silviculture which may produce pollutants are:

1. Access Systems- The forest access road system is constructed to provide access for man, materials and equipment to production units and to serve as routes for transport of harvested logs from the production unit. Such roads are also used for management and protection of successive timber crops, and for other access purposes, including recreation. In terms of construction, these roads range

from very narrow trails, through unsurfaced roads to higher speed paved roads. The frequency of use is highly variable ranging from intensive use to only occasional usage over a number of years.

Nationally, and in certain specifications the forest road system is the major contributor of sediment to the streams in forested areas. These sediment loads may originate as a result of road construction (including stream crossings), direct erosion from the roads, indirect erosion caused by changes in drainage patterns and systems, and mass soil movement due to slides and slips.

In addition to the sediment problems, additional pollution problems may be created due to debris (organic pollution) resulting from construction and log transport, and from herbicides used to control re-growth in the right-of-way.

2. Harvesting Systems-- The harvest system includes the process of felling the tree, preparing it by de-limbing and cutting into desired lengths, and moving it to a central accessable location for transport out of the forested area. The four basic harvest systems used in the United States include seed tree, shelterwood, selection and clear-cutting.

The harvesting of timber results in removal of cover, to some degree, from the forest floor. Improper choice (or performance) of the harvesting system may seriously increase the erosion phenomena and consequently, the potential for sediment pollution. Similarly soil movement may occur due to increased percolation resulting from removal of the vegetative cover.

After felling, the timber is moved (yarded) to a temporary storage site or "landing" by one of three basic general methods--tractor (on skid trails). high lead, or skyline cable. Recently, timber producers have also experimented with ballon and helicopter. Obviously, the magnitude, the disturbance of earth, and vegetative cover would be reflected on the erosive tendency with its consequent danger of sediment pollution. Each system, when properly chosen and operated can minimize environmental problems.

In addition to the sediment pollution, the harvesting system can create organic pollution problems due to debris and slash washed from the forest floor or otherwise reaching streams, pollution due to various chemicals used in the growing and harvesting operation, and thermal pollution due to removal of the canopy over streams.

3. Crop Regeneration- Regeneration of a harvested area includes both the natural regenerative process and man's activities in preparing and improving the site followed by planting or reseeding. The major activities include (a) debris removal to reduce fire hazard and allow use of equipment for subsequent operations, (b) reduction or removal of brush cover and undesireable species of trees and, (c) cultivation of the soils.

The use of fire, chemicals and soil disturbing machinery increase the potential for sediment and other pollution to occur. The time span for such pollution to occur is variable depending upon the climatic factors and operational schedule.

4. Intermediate Practices - Other silvicultural processes relating to thinning of an immature forest, fertilizer application and pesticide treatments are undertaken during the crop cycle. In general these activities are infrequent during the crop cycle.

The thinning process involves the removal of selected trees from an immature forest, in essence a type of harvesting, which would tend to generate sediment pollution, but at a lesser rate than harvesting.

Chemical application, (fertilizers and pesticides) can result in water pollution, if improperly carried out or adversely affected by extreme and unexpected natural event.

## Pollutants Originating from Silvicultural Activities

The principle pollutants generated by silvicultural activities are sediments and debris; chemicals, including nutrients, pesticides, and fire retardants; and thermal effects. The origin of the pollutants is generally related to more than one of the activities of the total silvicultural operation.

1. Sediment--Sediments are the most common pollutants resulting from silvicultural activities. The sediments principally result from the erosion of soils, but may also include debris and other organic waste. Sediments upset balanced ecology within streams by smothering bottom organisms in water bodies through the formation of bottom blankets, interfere with the photosynthesis processes by reducing light pentration, serve as carriers of nutrients and pesticides, inhibit fish reproduction of many important species, and by altering stream flow and speed.

2. Nutrients-- Nutrients, above the natural levels of an area, generally result from the application of fertilizers. Soluble nutrients may reach surface or ground water through runoff, seepage, and percolation. Insoluble forms may be adsorbed on soil particles and reach surface water through erosion processes. Nutrients may also reach surface water by direct washoff of slash, debris, and recently applied fertilizer. Excessive nutrients can lead to imbalance in the natural life cycles of water bodies and in some cases can be a health hazard.

3. Pesticides -- Pesticides applied during forest management activites may be insoluble or soluble. The entrance of pesticides into the surface or ground waters follows approximately the same pattern as nutrients. Pesticides may result in acute toxicity problems in the water bodies; or insidious toxicity problems through the entire food chain from lowest to the highest forms of life.

4. Organic Pollutants-- Debris, i.e., slash and other non-merchanable materials, are the principle organic pollutants that result from silvicultural activities. The pollutants may reach surface waters through direct dumping, washoff, and leachate from log storage. The organic materials place an oxygen demand on the receiving waters during their decomposition. In addition they may lead to other problems such as tastes, odors, color, and nutrients.

5. Thermal-- Thermal pollution from silvicultural activities most often results from the removal of canopy cover from stream bodies causing water temperature to rise. Temperature is a significant water quality parameter. It strongly influences dissolved oxygen concentrations and bacteria populations in streams. The saturated dissolved oxygen concentrations in streams is inversely related to temperature.

## Best Management Practices for Pollution from Silviculture

Best Management Practices for silvicultural sources is the most practical and effective measure or combination of measures which, when applied to the forest management unit, will prevent or reduce the generation of pollutants to a level compatible with water quality goals.

In BMP selection, it should be recognized that the variability in sources, topography, climate, soils, etc., will in most cases preclude a single BMP covering all activities or situations. The BMP must be tailored to the needs of the particular source and physical conditions.

The principle emphasis should be placed on measures that will prevent or reduce the pollutants in the runoff, seepage, or percolation from the forest management unit. The preventive measures must be fully integrated into the total management system for the particular forest management unit. In essence, the soils, nutrients, pesticides, and other chemicals must be kept on the land area where they perform their intended function of assisting tree growth.

Because of the widespread nature of sediment runoff, erosion control measures must be a principle thrust of the preventive program of each management unit. Particular attention must be paid to erosion prevention measures for logging roads and harvesting activities. In addition to primary control measures, supplemental measures such as debris and sediment basins should be included where necessary to further reduce or prevent the entrance of sediments, slash, and debris into water bodies. Where nutrients, pesticides and other chemicals cause particular problems in surface or ground waters, further control measures may be necessary. The measures would principally relate to the application (timing, method, and amount), utilization, and management of the fertilizers, pesticides, and fire retardant chemicals. Care must be exercised to insure that thermal problems in streams are not created by removal of shade canopy. . Attention to proper forest management, engineering and harvesting principles can substantially reduce all pollution attributable to silviculture.

## Prevention and Reduction Measures

The measures which can be applied to a timber management unit to prevent or reduce pollutants from reaching surface and/or ground waters can be classified as two (2) general types. These are (1) non-structural or management decision measures, and (2) structural or physical measures.

Management decision measures involve incorporation of water quality protection considerations into the planning and design of activites within the timber management unit. It is at this stage that logging access roads locations and design, harvesting methods, and reforestation decisions must be made. Structural measures generally involve some physical method or technique utilized to reduce erosion and prevent sediment runoff.

Nonstructural measures can be effective methods of reducing pollution generated by silvicultural activities, e. g.:

A. Pollution emenating from access systems may be greatly decreased by careful location, design, construction and maintance of the roads. The importance of not utilizing waterways or normally wet areas as part of the road-access system cannot be over emphasized.

B. Pollution caused by the harvesting operation can be reduced, under certain soil conditions, by mininizing the disturbance or compaction of the soil. Careful location and use of skid trails, particular when the ground is wet, will reduce sediment generation due to the skidding operation. As in the case of roads, skid trails should not be located in normally wet areas, nor should they utilize streams as part of the route. Like road, the trails should follow the contour of the land rather than provide long steep grades. Careful handling of debris will prevent accumulation, which tend to act as dams in streams, and which on breakup, result in high stream velocities causing channel erosion. Early revegetation of disturbed areas will provide stabilization of the soil, thus minimizing erosion.

C. Pollution caused by the regeneration activity and intermediate practices can be minimized by application of proper techniques under favorable conditions by well trained and supervised personnel. Additional techniques, such as provisions of buffer strips along streams may be useful.

Structural measures are utilized when necessary to further reduce erosion and prevent sediment runoff. These measures include culverts, ditches, berms, catch basins, slope stablization, and various road building techniques.

Information Sources

Reduction measures and preventive techniques are generally described in "Processes, Procedures, and Methods to Control Pollution Resulting from Silvicultural Activities" , EPA 420/9-73-010. More Specific information on logging roads is contained in "Logging Roads and Protection of Water Quality", EPA 910/9-75-008, Region X, Environmental Protection Agency. Additional information on features and design of specific measures and management practices may be obtained from other Federal agencies, State agencies, and various forestry associations and publications.

# BEST MANAGEMENT PRACTICES
# CONSTRUCTION NONPOINT SOURCES
# WATER POLLUTION

DRAFT
DEC 18 1975

Construction is a broad category covering the alteration and development of land for a different use including the installation of structures on the land. The types of projects within the category generally have two common characteristics, namely; (1) They involve soil disturbance, resulting in modification of the physical, chemical, and biological properties of the land; and (2) They are short-lived in the sense that the "construction phase" closes when the development and building activities are completed. Storm waters should be controlled for the life of the facilities to protect downstream areas.

## Introduction

This guidance is intended to provide information regarding the control of pollution from nonpoint source construction activities, and to supplement information regarding control of construction associated descharges under the provisions of NPDES and Section 404(e) of the FWPCA.

Construction activities can result in the development of significant sources of pollutants which may reach surface or ground waters. About one million acres of land are being disturbed for construction purposes each year in the United States. Pollution resulting from these construction areas can be catastrophic in downstream areas, particularly in small drainages. This statement is intended to provide guidance in the control of construction nonpoint sources and for the selection of pollution prevention or reduction measures that are useful in reaching water quality goals.

Construction nonpoint sources are the land development and building projects that result in the runoff, seepage or percolation of pollutants to the surface and ground waters. The runoff of pollutants generated by the project is strongly dependent on climatic events such as rainfall or snowmelt. In general, the runoff is intermittent and does not provide a continuous discharge. The nature of the pollutants depends on the particular activities underway at the time of the rainfall or snowmelt. Both the nature and amount of pollutants are also dependent on other factors such as soil types, topography, project characteristics, and the number of people and equipment involved.

## Description of Construction Activities

There are many types of projects that fall within the construction category. They generally can be classified into the following sub-categories:

1. Land Development -- Land development involves the construction of housing subdivisions, shopping centers, schools, recreation areas, and related facilities. The areal extent of the land affected is generally large although a project may be completed in segments. Topographic slopes are usually gentle with cut and fill sections relatively minor.

2. Transportation and Communication Networks -- Construction of transportation and communication facilities involves disturbance of the land principally in a linear direction. Areas may be quite large but the width of the disturbed areas is minor compared to their linear extent. These facilities often are located in areas of high relief where slopes may be steep and rugged. Climatic differences are extremely diverse in many of these areas with torrential rains prevalent in higher altitudes.

3. Water Resource Facilities -- Construction of water resource facilities involves disturbing the ground surface for installation of dams, aqueducts and their appurtenant structures. Dams may be located in relatively steep river valleys or canyons, or in areas of fairly low relief. Aqueducts have a great linear extent and are generally located along valley or foothill areas. Climatic differences at these sites may be extremely variable with intense rainfall occurring in mountain areas.

Dams in higher topographic areas may be underlain by hard, non-erodible bedrock. Dams and aqueducts in lower areas generally are located in erodible soils and/or parent materials.

4. Other -- Construction of factories, major office buildings, airports, power plants, etc. is included in this subcategory. Except for airports, the areal extent of these facilities is generally limited and almost all require extensive subsurface excavation. They are generally located in areas of fairly low relief with relatively low cut and fill slopes involved.

## Identification of Pollutants

Sediment, resulting from erosion of disturbed soils on construction sites, is one of the principal pollutants. It includes solid mineral and organic materials which are transported by runoff water, wind, ice, or the effect of gravity. Chemical pollutants derived from construction activities originate from inorganic and organic sources and occur in solid form such as asphalt, boards, fibers, or metals; or in liquid form such as paints, oils, glues, pesticides, and fertilizers. Biological pollutants include organisms resulting from soils, animal, or human origins. They may be bacteria, fungi, or viruses. Excess storm water runoff can be a severe cause of pollution. It results from changed conditions due to construction activities.

1. Sediment -- Sediment exerts physical, chemical and biological effects on the receiving stream and water bodies. Physical damage resulting from sediment deposition includes: reduction of reservoir storage capacity, filling harbors and navigation channels, increasing the frequency of flooding and causing bank erosion, increasing turbidity in

water and reducing light penetration, increasing the cost of water treatment, damaging fish life, destroying and covering organisms on the bottom of streams, reducing the flowing speed and carrying capacity of streams, and impairing operation of drainage ditches, culverts, and bridges, altering the shape and direction of stream channels, destroying water recreational areas, and imparting undesirable taste to water.

2. Chemicals -- The major categories of chemical pollutants are: petroleum products, pesticides, fertilizers, synthetic materials, metals, soil additives, construction chemicals, and miscellaneous wastes from construction.

Some petroleum products impart a persistent odor and taste to water, impairing its use for drinking water and contact sports. Many oils have the ability to block the transfer of air from the atmosphere into water, resulting in the suffocation of aquatic plants, organisms, and fish. Some petroleum products contain quantities of organo-metallic compounds (nickel, vanadium, lead, iron, arsenic) and other impurities which can be toxic to fish and other organisms.

The three most commonly used pesticides at construction sites are herbicides, insecticides, and rodenticides. The unnecessary or improper application of these pesticides may result in direct contamination of water, or indirect pollution by dirt which settles in surface water, or transport off soil surfaces into water.

Nitrogen and phosphorous are the major plant nutrients used for the successful establishment of vegetation on disturbed soils of construction sites. Heavy use of commercial fertilizers can result in these materials reaching water bodies to accelerate the eutrophication process.

The construction industry utilizes many different types of synthetic products. These include structural frames, window panes, wall board, paints, and many others. Heavy duty construction materials are synthesized from nondegradable organic materials. They are little affected by biological or chemical degradation agents, and are usually designed to withstand the most severe physical conditions.

The concern over metal pollution of water bodies is associated mostly with the heavy metals (mercury, lead, zinc, silver, cadmium, arsenic, copper, aluminum, iron, etc.). Metals are used extensively in construction activities for structural frames, wiring, ducts, pipes, beams, and many other uses. Construction vehicles, gasoline, paints, pesticides, fungicides, and construction chemicals are also potential sources of heavy metals pollutants. When these latter materials are weathered, decomposed and disintegrated by various agents, they ultimately form oxides and salts that can affect aquatic organisms.

Soil additives are chemicals and materials that are applied to the soil during construction activities in order to obtain desired soil characteristics. Often construction activities cover large areas consisting of several different types of soils. The nature of soils is dependent on the climatic, topographic and geological conditions. The type of soil additive applied depends on the objectives of the construction activities. Soils may vary from one location to another in the amount of water they contain, particle size distribution (clays, silt, sand and gravel), water infiltration rate, ability to support heavy structures, and resistance to compaction by construction equipment. Soil additives are used to control the amount of moisture absorbed by roadway surfaces, to reduce the degree of shrinking and expanding of clay soils in order to prevent structural damage of buildings and air field runways, and to increase the firmness of soils. Several materials are used to obtain desired soil properties. Commonly used materials include lime, fly ash, asphalt, phosphoric acid, salt, and calcium chloride. The soil additives carried in runoff from construction sites alter the quality of receiving waters. However, little work has been conducted to show the net environmental effects of these soil additives.

Many other chemicals are used in construction for purposes such as: pasting boards together, sealing cracks, surface treatment, solvents for oils and paints, and dyeing and cleaning. The amounts of chemicals leaving construction sites as pollutants have not been established. Poor construction activities that are liable to contaminate water resources include the following practices: dumping of excess chemicals and wash water into storm water sewers; indiscriminate discharging of undiluted or unneutralized chemicals; disregard for proper handling procedures resulting in major or minor spills at the construction site; and leaking storage containers and construction equipment.

Miscellaneous pollutants include concrete wash from concrete mixers, acid and alkaline solutions from exposed soil or rock units high in acid, and alkaline-forming natural elements. Cuts through coal beds have resulted in the seepage of mine acids into streams. High lime areas often increase the alkalinity of receiving waters.

3. Biological Materials -- Biological pollutants from construction include soil organisms and organisms of human and animal origin. They include bacteria, fungi, and viruses. The majority of biological pollutants are found in the topsoil layer where they can feed on dead plants, animals, birds and other organisms.

The biological pollutants resulting from construction activity indicate that the greatest pollution potential are of animal and human origin. They are more prevalent on construction sites where improper sanitary conditions exist.

## Basis For Best Management-Practices Development

Best Management Practices for construction are the most practical and effective measure or combination of measures which, when applied to the land development or building project, will prevent or reduce the runoff of pollutants to a level compatible with water quality goals.

Since the amount of pollutant runoff from construction sites depends on numerous variables such as the type of construction involved, the quantity and intensity of rainfall, the soil characteristics, etc., it is recognized that those particular types of control measures that will prevent this runoff must be installed on the site. The proper mix of control measures must be established on site-specific basis. Whether they are properly installed and maintained must be checked by on-site inspection as there is no way that effluent monitoring can accomplish this.

Best Management Practices for construction activities consist of measures which will prevent the movement of pollutants from construction sites. While sediment is the principal pollutant resulting from earth-disturbing construction activities, chemicals, hydrocarbons, solid wastes, and other materials must also be considered.

## Description of Preventive and Reduction Measures

There are essentially three basic measures for controlling the runoff of sediment from construction sites. They include: (1) preventing erosion of exposed soil surfaces, (2) restricting the transport of eroded particles, and (3) trapping sediments being transported. Measures developed for controlling movement of sediment and other materials by water generally are also useful for controlling that generated by wind action.

Preventing erosion of exposed soil surfaces is achieved by protecting these surfaces with such coverings as mulch; sheets of plastic, fiberglass roving, burlap, rock blankets, or jute netting; temporary growths of fast-growing grasses; or sod blankets. Mulch consists of hay, straw, wood chips, bark, or any other suitable protective material. Sheets of plastic and netting materials are generally used on steep slopes where vegetation is difficult to establish or erosion rapid. Seeding of temporary fast-growing grasses is most desirable when final grading cannot be done until a later date and climatic conditions permit. Sod often is used as a covering in critical areas susceptible to erosion.

Limiting the areal extent of soils disturbed at any one time is a usable mechanism for minimizing erosion. It can be achieved by planning and carrying out the job so that as work progresses existing vegetation is removed only on that area of soil surface essential to immediate work activities. Construction activities are completed on each exposed area and revegetation accomplished as rapidly as feasible.

Solid wastes should be collected at the site and removed for disposal in authorized disposal areas. Frequent garbage removal is essential. Any useful materials can be salvaged or recycled. Often, borrow pits, or excavations can be filled with inert solid wastes.

Runoff of construction chemicals resulting from paints, cleaning solvents, concrete curing compounds, and petroleum products, can be largely restricted by sediment control measures as many of these materials are carried by sediment particles. Good "housekeeping" procedures such as proper disposal of empty containers, prompt cleanup of accidental spills, and neutralization or deactivation of excess chemicals and wash waters should minimize runoff of the remaining materials.

## Information Sources

Nonpoint source pollution control practices discussed above in summary form are described in more detail in the following publications ?

> "Processes, Procedures, and Methods to Control Pollution Resulting From All Construction Activity" EPA 430/9-73-007, October 1973
>
> "Comparative Costs of Erosion and Sediment Control, Construction Activities" EPA 430/9-73-016, July 1973
>
> "Guidelines for Erosion and Sediment Control Planning and Implementation" EPA R2-72-015, August 1972

Additional data regarding design of structures, specifications for vegetative practices, instructions for installation of surface protective coverings, and other useful measures are available in numerous published standards and specifications, manuals, handbooks, or guides. They are generally prepared and issued in local areas by States, Counties, or Conservation Districts, with the assistance of the U.S. Soil Conservation Service.

D
DEC 18 197[illegible]

# BEST MANAGEMENT PRACTICES
# AGRICULTURAL NONPOINT SOURCES
# WATER POLLUTION

Agricultural nonpoint sources are a broad category covering all crop and animal production activities. Crop production includes both irrigated and non-irrigated production, such as row crops, close grown crops, orchards and vineyards, and fallow land temporarily out of production. Animal production includes such systems as pasture and rangeland grazing, semiconfined feeding and grazing, and concentrated animal feeding operations.

## Introduction

This guidance is intended to provide information regarding the control of pollution from a agricultural nonpoint sources, and to supplement information regarding the control of agricultural discharges regulated under the requirements of NPDES. Agricultural production activities provides, on a national scale, significant sources of pollutants which reach both surface and ground waters. These may be either point sources or nonpoint sources, or combinations of the two.

## Description of Agricultural Activities

Agricultural nonpoint sources are the crop and animal production systems that result in diffuse runoff, seepage, or percolation of pollutants to the surface and ground waters. There are a number of different activities within each of the systems that may cause water pollution. The runoff, seepage or percolation of pollutants generated by the activities are strongly dependent on climatic events such as rainfall and snowmelt. In general, they are intermittent and do not represent a continuous discharge. The nature of the pollutants depends on the particular activities underway at the time of the climatic events. Both the nature and amount of pollutants are also dependent on other factors such as soil types, topography, crop and animal types, and crop and animal production methods.

### Crop Production

There are five general categories of activities associated with crop production which can produce the potential for nonpoint source pollution:

1. The disturbance of the soil by tillage or compaction by machinery.

2. The alteration of natural vegetative patterns by substituting crop plants for natural vegetation or leaving the soil without vegetative cover.

3. The increase in available nutrients, over the quantity available through natural cycles, by the application of fertilizers.

4. The introduction of chemical compounds not found in significant quantities under natural conditions such as by the application of pesticides.

5. The application of surface or ground waters for the purpose of irrigating crops.

## Animal Production

There are three general categories of activities associated with animal production which can produce the potential for nonpoint source pollution:

1. Concentration of animals (and their wastes) in a particular location for an extended period of time such as at feeding areas.

2. Overgrazing of range and pasture lands that removes vegetative cover from the land.

3. Concentration of animals instreams or along stream banks in such numbers as to cause disturbance of the stream bottoms or banks, or result in direct deposit of manure into streams.

## Identification of Pollutants

Six general types of nonpoint source pollutants that may result from activities associated with agricultural production systems are:

1. Sediment: Sediments, by volume, are the most serious pollutants resulting from agricultural production. They include principally mineral fragments resulting from the erosion of soils but may also include crop debris and animal wastes. Sediments can smother organisms in water bodies by forming bottom blankets, interfere with the photosynthetic processes by reducing light penetration, and act as carriers of nutrients and pesticides. Deposits also may fill reservoirs and hinder navigation.

2. Nutrients: Nutrients, above the natural background levels of an area may result from fertilizer applications and animal wastes. Soluble nutrients may reach surface and ground water through runoff, seepage, and percolation. Ions may be adsorbed on soil particles and reach surface water through sedimentation processes. Nutrients may also reach surface water by direct washoff of animal wastes and recently applied fertilizer.

Excessive nutrients can lead to imbalance in the natural nutrient cycles and cause eutrophication. In some cases, excessive nutrients can be a health hazard.

3. Pesticides: Pesticides which are applied in the agricultural production unit may be insoluble or soluble. The entrance of pesticides into the surface or ground waters follows approximately the same patterns as nutrients. Pesticides may cause acute toxicity problems in the water bodies or insidious toxicity problems through the entire food chain.

4. Organic Materials: Animal wastes and crop debris are the principal organic pollutants that result from agricultural production. They may reach surface waters through direct washoff, or, in their soluble form, reach both surface and ground waters through runoff, seepage or percolation. The organic materials place an oxygen demand on the receiving waters during their decomposition. In addition, they may lead to other problems such as tastes, odors, color, and nutrient enrichment.

5. Salinity (TDS): The necessity of leaching to remove, or prevent the damaging accumulation of salts in the root zone of plants has the potential of inducing subsequent quality problems in both surface and ground waters if agricultural waters are not properly managed. Percolating water may reach ground water through further deep percolation, or move laterally into surface water bodies. The problem becomes more pronounced when the applied irrigation water initially contains dissolved solids which will become more concentrated as the plants remove water for their use. Severity of pollution depends not only on the nature of the receiving waters but also on the nature of the uses of the receiving waters.

6. Microorganisms: Any potential disease-causing microorganisms (pathogens) in water are a matter of concern to the health and safety of the water users. Animal wastes are the principal source of pathogenic microorganisms resulting from agricultural production. Pathogens reach the water bodies through the same routings as the animal wastes.

## Basis For Best Management Practices Development

Best Management Practices for agricultural production are the most practical and effective measure or combination of measures, which when applied to the agricultural management unit, will prevent or reduce the generation of pollutants to a level compatible with water quality goals. They often enhance the productivity of the soil as well as control pollution.

Because of the variability in production methods, crops and animals, soil types, topography, climate, etc., the BMP for any specific agricultural management unit or area will vary. The selection of Best Management Practices for a particular agricultural management unit or area is a complex process. Any measure or combination of measures applied to an agricultural management unit or area which will achieve water quality goals is a potential BMP. However, the measures are generally the type that are incorporated into a soil and water conservation plan as developed by a landowner or land user, with the assistance of a conservation district and/or the Soil Conservation Service, Extension Service, Forest Service, and others.

The principal emphasis should be placed on measures that will prevent or control the runoff, seepage or percolation of pollutants from crop or animal production management units. Preventive measures must be fully integrated into the total production management system of the agricultural management units. In essence, the soils, nutrients and pesticides should be kept on the land where they perform their intended agricultural function.

Because of the widespread nature of sediment runoff, erosion control measures should be a principal means of controlling pollution from each agricultural management unit. Control of erosion not only will prevent soils from leaving the land, but also will materially reduce the nutrients and pesticides that reach the nation's waters adsorbed to soil particles. Where necessary, to further prevent or reduce the entrance of sediments into water bodies, supplemental measures such as debris and sediment retention basins should be utilized.

In cases where excess amounts of nutrients, pesticides and animal wastes cause particular problems in surface or ground waters, additional control measures may be necessary. These measures might relate, for example, to the application (timing and amount) of fertilizers and pesticides, the prevention of the concentration of animals, and the collection and adequate disposal of the animal wastes. Salinity buildup resulting from irrigation must be analyzed in terms of the particular problem with subsequent development of appropriate measures.

## Description of Prevention and Reduction Measures

Measures which can be applied to an agricultural management unit to prevent or reduce pollutants from reaching surface or ground waters can be generally classified into four categories. They are: (1) structural measures, (2) conservation cropping systems and animal management systems, (3) quantitative and qualitative management of cropping system inputs, (4) vegetative measures.

Structural measures generally involve some physical method designed to reduce erosion or prevent sediment runoff. They include such things as barriers applied at the source such as terraces, conveyance systems to enhance non-erodable flows such as waterways and drop structures, and catchment systems for the final clarification such as debris basins. Off-stream watering points, controlled access watering points at water bodies, diversions around feeding areas, and manure trapping basins are considered to be structural measures.

Cropping systems and animal management systems involve the spacial and sequential arrangement of crop plant and animal populations. The arrangement of crops on a field such as strip cropping, crop rotation such as sod-forming grass rotation systems, and tillage methods such as minimum tillage can significantly reduce pollutant transport. Control of animal populations so as to prevent overgrazing or the concentration of animals in particular locations can reduce erosion, sediment runoff, and the runoff of concentrated animal wastes.

Inputs into cropping systems which are not efficiently utilized can become potential pollutants. Nutrient and pesticide applications should be matched to the immediate needs of the agricultural production systems. The timing of the applications should take into consideration external hydrologic forces. The efficient use of irrigation water can materially reduce the salinity buildup problems associated with runoff, seepage, and percolation of the water not utilized by the plants.

Vegetative covering on bare, or exposed soils is any crop planted solely to prevent, or control erosion and sediment runoff. It can be used during the winter months, between regular crops during the growing season, or where denuded areas have resulted from overgrazing or some other activity. The vegetative cover protects the bare ground from the erosive energy of falling rain and flowing runoff water and filters out sediment actually being transported in the runoff water leaving the site.

## Information Sources

The prevention and reduction measures outlined in the foregoing are generally described in "Methods and Practices for Controlling Water Pollution from Agricultural Nonpoint Sources," EPA-430/9-73-015. Oct 1973. Data on control of dust is presented in "Investigation of Fugitive Dust, Volume 1: Sources, Emissions, and Control" EPA-450/3-74-036a June, 1974, Specific information on the application of the measures for agricultural nonpoint sources and water quality management is contained in "Control of Water Pollution from Cropland, Volume I " USDA, ARS and EPA, ORD. November 1975. "Interim Report on Loading Functions For Assessment of Water Pollution from Nonpoint Sources" EPA; ORD.

November, 1975 provides data for assessing the problem. Information on specific aspects of agricultural nonpoint source pollutants and their control can be found in research reports of EPA, USDA, and other Federal agencies, State and local agencies, colleges and universities, and agricultural trade associations and in grazing and range management documents by these groups.

Design information on various conservation methods can be obtained from Soil Conservation Service handbooks. Specific information on particular locations can be obtained from SCS Field Offices, the Extension Service, soil and water conservation district offices, and other informed agencies and groups.

★ U. S. GOVERNMENT PRINTING OFFICE : 1976 622-389/388